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FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES

FIT PROJECT

TASK REPORT TO THE ENVIRONMENTAL PROTECTION AGENCY CONTRACT NO. 68-01-6056

REMEDIAL APPROACH PLAN
FOR
LEES LANE LANDFILL
LOUISVILLE, KENTUCKY

TDD F4-8109-08A

THRU 1981

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EXECUTIVE SUMMARY

Under the provisions of Environmental Protection Agency (EPA) Technical Direction Document number F4-8109-08A, Ecology and Environment, Inc. has been tasked to prepare a Remedial Approach Plan for Lees Lane Landfill in Jefferson County, Kentucky. This plan is designed to present an accurate description and history of the landfill, make an assessment of the known hazards and describe, in general terms, actions to remit or reduce the identified hazards. The landfill is located 4.4 miles southwest of Louisville, Kentucky, and occupies approximately 125 acres of land on the eastern bank of the Ohio River. The site was a sand and gravel quarry operated by the Hofgesang Company. Between 1948 and 1975 the area was used as a landfill for domestic, commercial and industrial waste. During this period portions of the site were also used as sand and gravel quarries.

In March of 1975 the migration of methane gas to the nearby community of Riverside Gardens caused the temporary evacuation of families in that area. This problem was finally solved in 1980 with the installation of a gas venting system to vent the methane gases that accumulated under the landfill. Although the explosive and fire potential from the accumulation of methane gas has been remitted, the gases emitted presently enter the atmosphere.

Erosion along the steep slopes of the site have resulted in the exposure of approximately 400 drums. Analysis of samples taken from these drums indicate the presence of 50 different hazardous constituents. The immediate hazard caused by this problem has been abated by removing the liquids and burying the empty drums on site.

Lees Lane Landfill has the potential for ground-water, surface-water and airborne contamination. The site is underlain by a very transmissive alluvial aquifer which discharges into the Ohio River. This hydrogeologic setting is very susceptible to contaminant transport. The site is in the flood-prone area of the Ohio River and ground-water monitoring, although begun, has not completely defined the extent of contamination.

Recommended actions for Lees Lane Landfill include limited immediate removal actions in the form of warning signs, extensive field investigations to locate waste, definition of the site hydrology as well as ground-water contamination and gas analysis. The approach to remedial action depends upon planned land and ground-water use for the area. If land and ground water will not be utilized in the future, a minimal closure plan is recommended. On the

other hand, if land and ground water will be utilized then a complete closure plan is recommended. The estimated cost of the immediate removal action is $1,000. The field investigation is $72,000, and minimum remedial response is $8.8 million. The complete closure is $14.2 million.

SECTION 1 - SITE BACKGROUND

1.1 LOCATION

Lees Lane Landfill, a tract of land approximately 125 acres in size, is located along the Ohio River in Jefferson County, Kentucky (Figure 1.1 and 1.2). The landfill is approximately 4.4 miles southwest of Louisville, Kentucky. A location reference point of the landfill is at the intersection of Lees Lane and the levee which is located at 38° 11' 44" latitude and 85° 52' 17" longitude.

1.2 PHYSICAL AND BIOLOGICAL DESCRIPTION

The topography of Lees Lane Landfill has been determined mainly by the extensive man-made excavation and fill operations at the site. A secondary, but major influence on the topography has been the erosional and depositional processes of the Ohio River. The landfill, located in the Ohio River Terraces physiographic province, is approximately 5,000 feet in length and averages approximately 1,500 feet in width. The northern and middle portions of the landfill consist of level to gently sloping land. The southern portion is pocketed with excavations with relatively steep slopes. Three terraces, each approximately 20 feet wide, comprise the slope on the riverside of the landfill. Relatively steep erosional cuts are common along the southern portion of this slope. The site is bordered on the east and south by the Corps of Engineers flood protection levee. Elevations range from 410 feet above mean sea level (msl) along the Ohio River to 463 feet msl along the levee.

The natural soils of Lees Lane Landfill consisted of fine-sandy loam to silty loam of the Wheeling-Weinbach-Huntington soil association. They were moderately- to well-drained soils on level to sloping topography (Zimmerman, 1966). The excavation and landfill operations at this site have disturbed the natural soil conditions such that the physical and chemical properties of the soil cannot be defined without detailed soil testing.

The climate of the Louisville area varys from very cold air masses from the northwest and the Great Lakes region in winter to very warm air masses from the Gulf of Mexico in summer. The normal annual precipitation for the area is 41.32 inches. Sixty percent of this value is lost as evaporation and transpiration (Bell, 1966).

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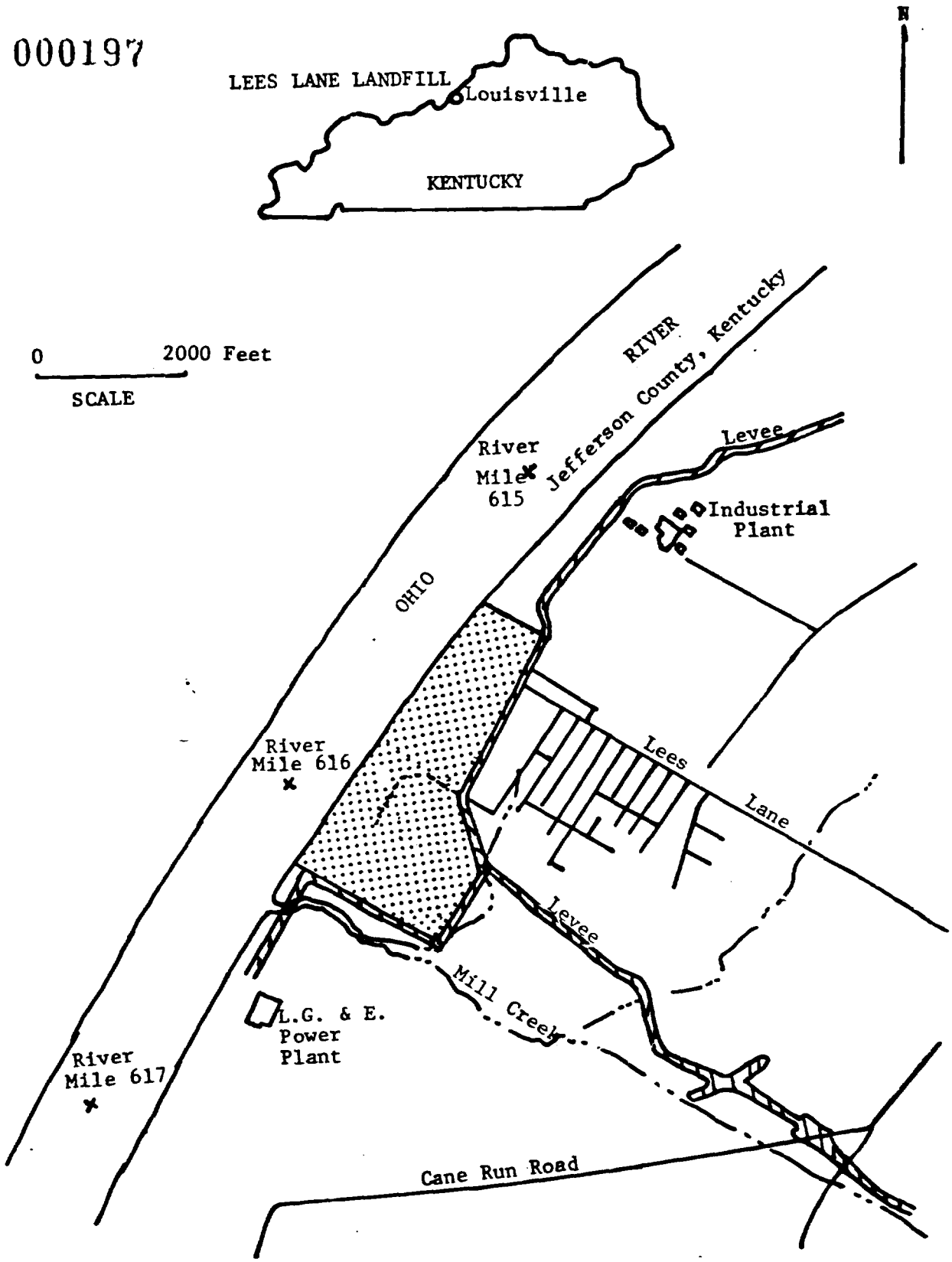
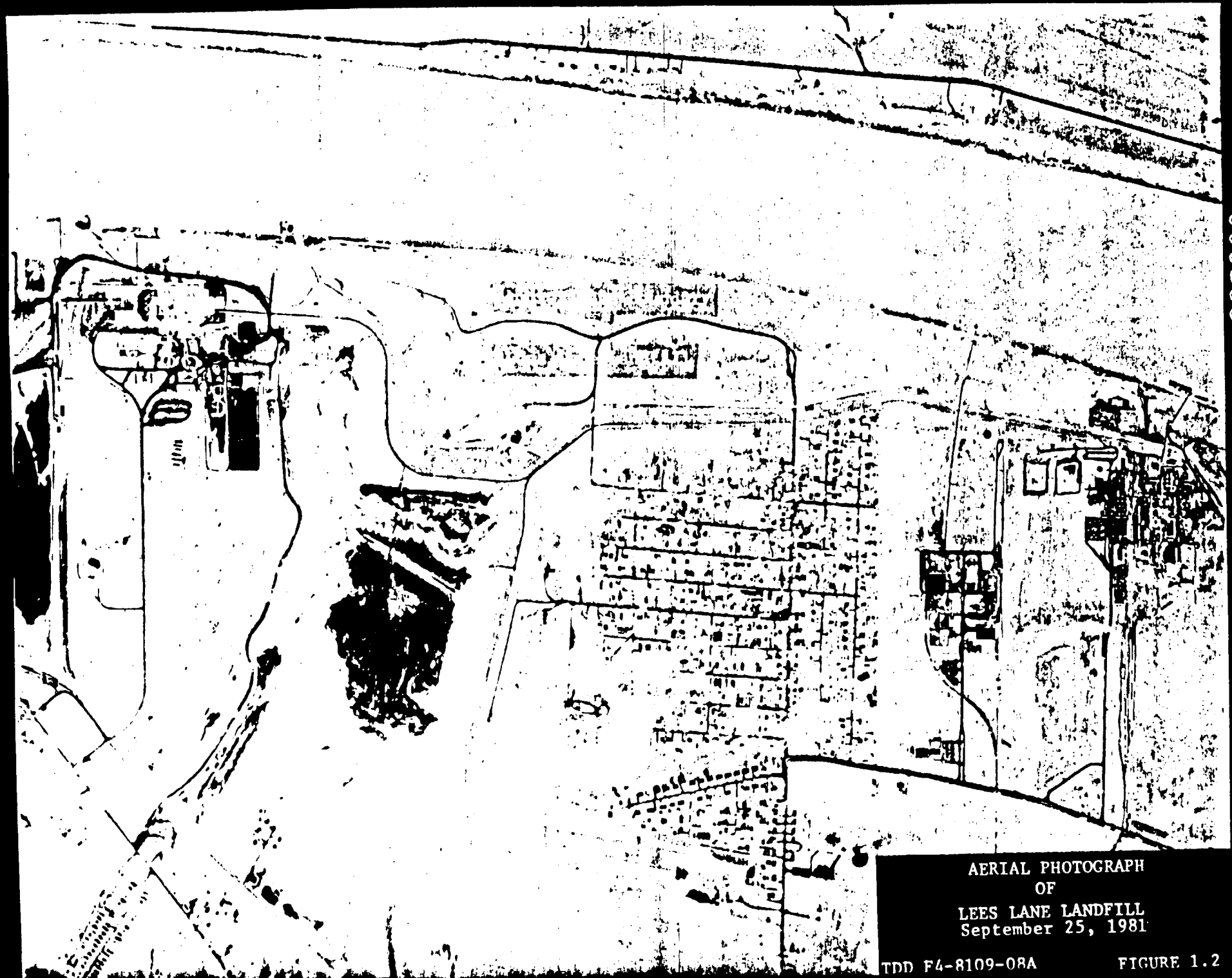


Based on Lanesville, IN - KY and Louisville West, KY USGS 7½' Quadrangle, 1960

LEGEND	ECOLOGY AND ENVIRONMENT, INC.	LOCATION OF LEES LANE LANDFILL
Lees Lane Landfill	FIELD INVESTIGATION TEAM	
	REGION IV ATLANTA	TDD F4-8109-08A FIGURE 1.1



AERIAL PHOTOGRAPH
OF
LEES LANE LANDFILL
September 25, 1981

TDD F4-8109-08A FIGURE 1.2

The terrestrial flora on and near Lees Lane Landfill has been subject to societal disturbances. The landfill surface supports typical field grasses. The grass cover is successfully established over most of the landfill, with the exception of some erosional areas near the river and in the Corps of Engineers levee construction area on the southern side of the landfill. North of the landfill there is an industrial park. The east side of the landfill is bordered by the levee which serves as a managed buffer zone between the landfill and the adjacent residential development. The west side of the site has a relatively undisturbed area which serves as a buffer zone between the landfill and the Ohio River. This strip of land supports a more dense growth of grasses, shrubs, and trees typical of bottomland riparian woods. This stretch of woods is subject to periodic inundation by the Ohio River.

The wildlife inhabiting Lees Lane Landfill must also be tolerant of human perturbations. Small mammals such as the house mouse, white-footed mouse and eastern mole would be expected to occur near the landfill. According to the Stanley Consultants report on the area south of the landfill, the most common species of birds include: common grackle, American robin, cardinal, mourning dove and gray catbird. Also, large flocks of "blackbirds" have been noted to gather in the area during early fall. This 1980 report states that waterfowl were infrequently encountered in the area south of Lees Lane Landfill (Riverport Environmental Impact (REI), 1980).

Aquatic communities of the Ohio River and some of its tributaries have been studied and characterized extensively. A study by the Ohio River Valley Sanitation Commission (ORSANCO) identified approximately 130 fish species that inhabit the river. The study notes however that changes in fish communities have occurred as a result of activities such as dam construction, dredging and channelization, and increased levels of pollution in the river (Mill Creek Environmental Impact Statement (EIS), 1979). Stanley Consultants performed an environmental inventory review of a 1,600 acre section of Jefferson County located immediately south of Lees Lane Landfill. In this report, a Dames & Moore 316(b) study conducted in 1975 for a power generating plant was referenced. The plant located at River Mile (RM) 617 was cited as having the best available site-specific data for fish species inhabiting this segment of the Ohio River. Stanley Consultants also reported on the fish species occurring in Lower Mill Creek which branches off of Mill Creek. Mill Creek empties into the Ohio River immediately south of the levee bordering the

southern portion of Lees Lane Landfill. A summary of the fish species identified in the Stanley Consultants report is provided in Table 1.1. In lieu of more current site-specific data, this listing is representative of the fish species most likely to occur in the vicinity of Lees Lane Landfill. In general, the fish identified in Table 1.1 are tolerant of stressful conditions resulting from poor water quality.

The invertebrate community of the Ohio River has also been subject to investigation. According to the Stanley Consultants report, the Ohio River was sampled in 1968 from RM 538 through RM 648 for mussel identification. The results of this study showed that 23 mussel species inhabit this section of the Ohio River. One mussel bed was located between RM 614.1 and RM 617.5, the segment of the river adjacent to the site. However, this population of shellfish was positioned on the Indiana side of the river. Seven commercially important species of shellfish, listed in Table 1.2, have been reported to exist between RM 538 and RM 648 to the Ohio River.

The benthic community of the Ohio River, as described by Stanley Consultants, is limited in part by the lack of suitable substrate. Near the shoreline in some areas there is a muddy substrate which serves as a habitat for oligochaetes (segmented worms). Farther away from the river bank, the substrate is typically sandy and the river currents are swifter so that conditions are too unstable to support a significant benthic community. Based on this general characterization, the benthic organisms near Lees Lane Landfill would be expected to be primarily comprised of oligochaetes. The segment of the Ohio River adjacent to the landfill is in the middle of a gradual curve such that the outside of the bend is on the Indiana side. The faster currents would then be expected to occur on the Indiana side of the river and the scouring action would lend itself to maintaining a sandy substrate on the west side of the river. The identification of a mussel bed in this portion of the river on the Indiana side supports this assumption because shellfish require fast-moving waters. The Kentucky side of the river, being on the inside of the river curve, would be expected to have slower moving currents. The slower flow would allow for the settling of a muddy substrate in the area adjacent to the landfill. In addition, the river bank next to the site provides some degree of shoreline cover from overhanging snag and debris. This snag cover further reduces the flow rate and provides additional substrate and niches for aquatic organisms. In summary, the characteristics of the invertebrate community as a whole in the river near the

TABLE 1.1

FISH SPECIES LIKELY OCCURRING
NEAR LEES LANE LANDFILL

SCIENTIFIC NAME	COMMON NAME
Polyodon spathula	Paddlefish
Alosa chrysochloris	Skipjack Herring
Dorosoma cepedianum	Gizzard Shad
Cyprinus carpio	Carp
Hybopsis storeriana	Silver Chub
Notropis atherinoides	Emerald Shiner
Notropis blennius	River Shiner
Notropis cornutus	Common Shiner
Notropis volucellus	Mimic Shiner
Carpiodes carpio	River Carpsucker
Carpiodes cyprinus	Quillback
Catostomus commersoni	White Sucker
Moxostoma carinatum	River Redhorse
Moxostoma crythrurum	Golden Redhorse
Ictalurus furcatus	Blue Catfish
Ictablurus melas	Black Bullhead
Ictalurus natalis	Yellow Bullhead
Ictalurus nebulosus	Brown Bullhead
Ictalurus punctatus	Channel Catfish
Pylodictus olivaris	Flathead Catfish
Morone chrysops	White Bass
Morone mississippiensis	Yellow Bass
Lepomis cyanellus	Green Sunfish
Lepomis gulosus	Warmouth
Lepomis macrochirus	Bluegill
Lepomis microlophus	Redear Sunfish
Micropterus salmoides	Largemouth Bass
Pomoxis annularis	White Crappie
Pomoxis nigromaculatus	Black Crappie
Stizostedion canadense	Sauger
Aplosinorua grunniens	Freshwater Drum

Reference: Riverport, EIR, 1980.

TABLE 1.2

COMMERCIALLY IMPORTANT SHELLFISH SPECIES COLLECTED BETWEEN RIVER MILE 538 AND RIVER MILE 648 OF THE OHIO RIVER

SCIENTIFIC NAME	COMMON NAME
Quadrula quadrula	Maple leaf
Quadrula metanevra	Monkey face
Pleurobema cordatum	Pigtoe
Pleurobema pyramidatum	Pigtoe
Fusconaia ebenus	Niggerhead
Amblema costata	Three Ridge
Megalonaias gigantea	Washboard

Reference: Mill Creek EIS, 1979

landfill is reported to be dominated by pollution-tolerate organisms (Mill Creek EIS, 1979).

Federally listed endangered animal species which have been known to inhabit the general area are identified in Table 1.3. There are no federally protected plant species in Kentucky.

1.3 HISTORY

Lees Lane Landfill first received wastes in 1948 from domestic, commercial, and industrial sources. Prior to and during its receiving wastes, the site was a sand and gravel quarry operated by the Hofgesang Company. In March 1975, home owners in Riverside Gardens, a community adjacent to the site, reported flash fires around their water heaters. Subsequent to an investigation and the detection of explosive levels of methane gas, seven families were evacuated from their homes near the site. In April 1975 the landfill was closed. Studies conducted by county, state, and federal agencies documented the presence of methane and other toxic gases in the subsurface east of the site. In 1978 an extensive monitoring program was conducted by Stearns, Conrad, and Schmidt Consulting Engineers to define the gas migration problem. A gas venting system was finally installed in October 1980 which, according to the Jefferson County Works Department, is operating satisfactorily (Robinson, 1981).

A more recent problem associated with this site is the discovery in February 1980 of approximately 400 exposed drums of hazardous materials on the Ohio River bank adjacent to the landfill. Over 50 compounds were identified by chemical analysis. They included phenolic resins, benzene, and relatively high concentrations of copper, cadmium, nickel, lead and chromium (See Appendix A for complete analytical results). Flash points were determined to be as low as 75°F. In October 1981 the liquid wastes were pumped from the drums. The empty drums, as well as solid wastes, were removed from the river bank and buried on site (Brooks, 1981).

Ground-water monitoring wells have been installed under the direction of the State of Kentucky to monitor the water-table zone underlying the site. These wells were not developed properly and therefore have limited use (EPA, Surveillance and Analysis Division (SAD), 1981). Additional monitor wells are needed to properly assess the ground-water contamination at Lees Lane Landfill. A more detailed summary of previous actions at the landfill is contained in Appendix B.

TABLE 1.3

FEDERALLY LISTED ENDANGERED SPECIES
OF GENERAL AREA NEAR
LEES LANE LANDFILL

SCIENTIFIC NAME	COMMON NAME
Mammals	
Myotis grisescens	Gray Bat
Myotis sodalis	Indiana Bat
Felis concolor cougar	Eastern Cougar
Birds	
Haliaeetus leucocephalus	Bald Eagle
Falco peregrinus anatum	American Peregrine Falcon
Falco peregrinus tundrius	Arctic Peregrine Falcon
Vermivora bachmanii	Bachman's Warbler
Campephilus principalis	Ivory-billed Woodpecker
Mollusks	
Epioblasma torulosa torulosa	Tuberculed-Blossom Pearly Mussel

Reference: U.S. Fish and Wildlife Service, 1981.

1.4 COMMUNITY RELATIONS CONSIDERATIONS

Past community relations dealing with Lees Lane Landfill have been coordinated by the Lees Lane Advisory Committee and the Lees Lane Task Force. These two organizations, composed of local, state, and federal government officials, became active following the 1975 methane gas problem. These organizations were instrumental in investigating the methane gas problem which resulted in the funding of studies and ultimately the installation of a gas vent system.

Present community relations are not active since the methane gas problem has been alleviated.

Future community relations will be dependent upon the remedial responses which will be undertaken at the site. Appendix C describes a projected plan for community relations (Hitchcock, 1981).

2.1 TYPE AND AMOUNT OF WASTE

Lees Lane Landfill received domestic, commercial, and industrial wastes over a 27-year period. The Eckhardt Report indicates a partial list of those companies which disposed of their wastes in the landfill. Table 2.1 lists these companies and the types and amounts of wastes (Eckhardt, 1979).

The principal analytical account of hazardous waste in the site is provided by five samples from the 400 drums which were exposed along the river. The drum samples contained 51 different organic compounds as well as high concentrations of copper, cadmium, nickel, lead, and chromium. Benzene, phenol, and their ethylated derivatives were also identified (Kentucky Department of Natural Resources and Environmental Protection (KYDNREP), 1980). During air quality monitoring, methane gas was identified along with vinyl chloride (EPA, 1975) (See Section 3.3). Ground-water monitoring has resulted in the identification of both organic and inorganic wastes (EPA, SAD, 1981) (See Section 3.2). The identities and quantities of all chemical wastes buried at the site are unknown.

2.2 LOCATION OF WASTE

There are limited data concerning the location of wastes on the site. One available aerial photograph taken on April 12, 1963 showed several fill operations as well as sand and gravel excavation operations (Figure 2.1). Partially buried drums were located on the terraces next to the river (Figure 2.2 and 2.3). The depth of the waste has been estimated to be as deep as 50 feet below land surface. To further define the location and depth of wastes on the site, surface geophysical methods such as magnetometer surveys and earth resistivity soundings and profiles should be conducted.

2.3 TOXICITY OF WASTE

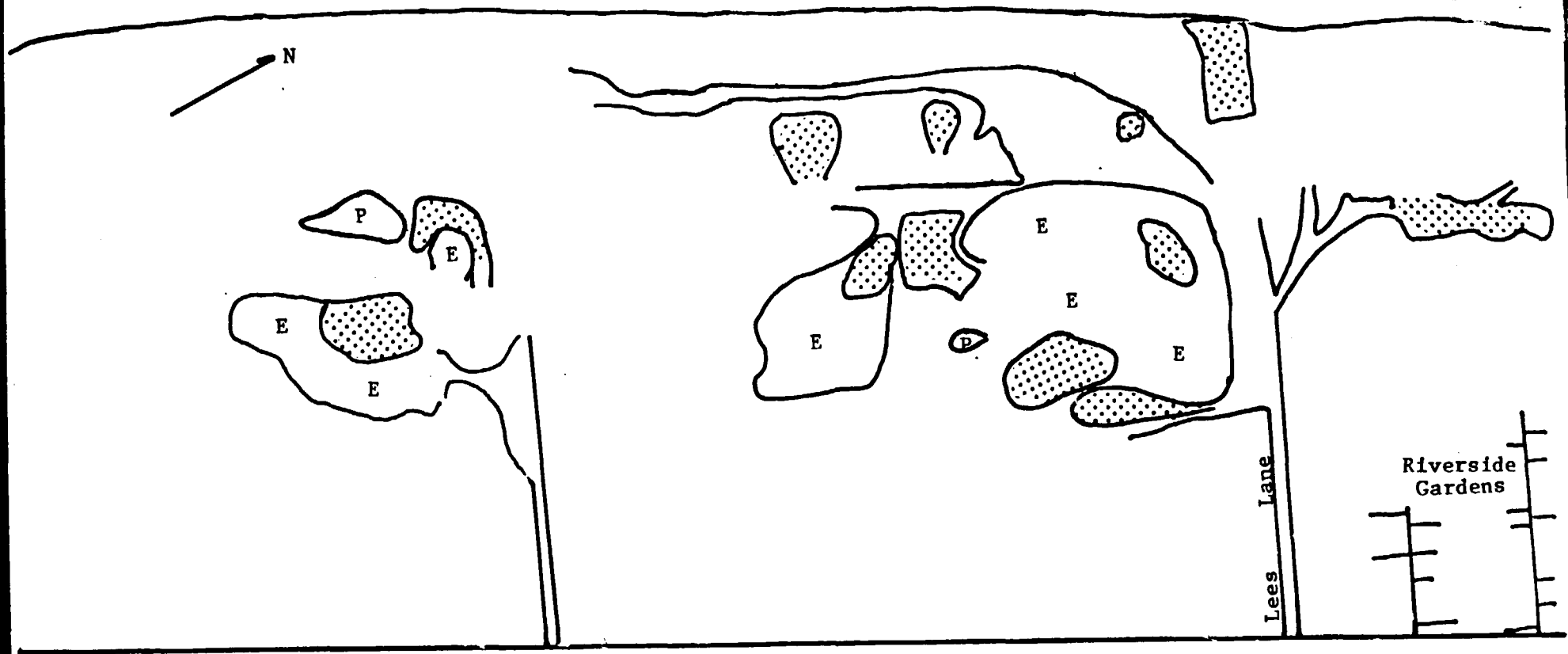
The samples from the drums along the river are moderately toxic from an acute standpoint, but chronic exposure to humans and the environment is a major pollution concern. Benzene, a listed human carcinogen, is among the chemical wastes. Chronic exposure to benzene, phenol, and their ethylated derivatives result in kidney, liver, and skin diseases and respiratory ailments. High concentrations of copper, cadmium, nickel, lead, and chromium

TABLE 2.1
HAZARDOUS WASTES REPORTED AS DISPOSED IN LEES LAND LANDFILL

COMPANY	DATES USED	DISPOSAL METHODS	HUNDRED TONS	TYPE OF WASTE
B.F. Goodrich	1948-1975	Industrial-Municipal Co-disposal	1689	heavy metals, trace metals, zinc, cadmium, copper, chromium (trivalent) lead, organic, halogenated aliphatics, acrylates and latex emulsions, plastizers, resins, elastomers, misc.
Harshaw Chemical Co	1950-1967	Industrial-Municipal Co-disposal	1	heavy metals, trace metals, arsenic, selenium, antimony, iron, manganese, magnesium, zinc, cadmium, copper, chromium(trivalent) chromium(hexavalent) lead, organics, insecticides and intermediates, amides, amines, imides, resins, inorganics, salts, miscellaneous, paints & pigments

TABLE 2.1
HAZARDOUS WASTES REPORTED AS DISPOSED IN LEES LAND LANDFILL (cont)

COMPANY	DATES USED	DISPOSAL METHODS	HUNDRED TONS	TYPE OF WASTE
Rohm & Hass	1962-1970	Industrial-Municipal Co-disposal Drummed Waste	343	acid solutions (with pH <3), organic acid manufacture,organics amides, amines, imides, plastizers, resins, inorganics, salts
Celanese Corp	1967-1974	Industrial-Municipal Co-disposal Drummed waste	91	acid solutions (pH <3), heavy metals, trace metals, arsenic, selenium, antimony, mercury, iron, manganese, magnesium zinc, cadmium, copper, chromium (trivalent),chromium (hexavalent), lead, organics,halogenated aliphatics, amides, amines, imides, resins, solvents (polar-except water) carbontetrachloride, other solvents (non polar), solvents (halogenated aliphatic) oils and oil sludges, esters and ethers, alcohols keytones and aldehydes, inorganics, salts, misc., paints and pigments, asbestos, wastes with flash point below 100°F



Ref; Aerial Photographs April 1963, Park Aerial, Louisville, Kentucky

LEGEND

Waste Area

P Ponds

E Excavated Area

ECOLOGY AND ENVIRONMENT, INC.
FIELD INVESTIGATION TEAM

REGION IV ATLANTA

LOCATION OF WASTE DISPOSAL AREAS
April 1963

TDD F4-8109-08A FIGURE 2.1

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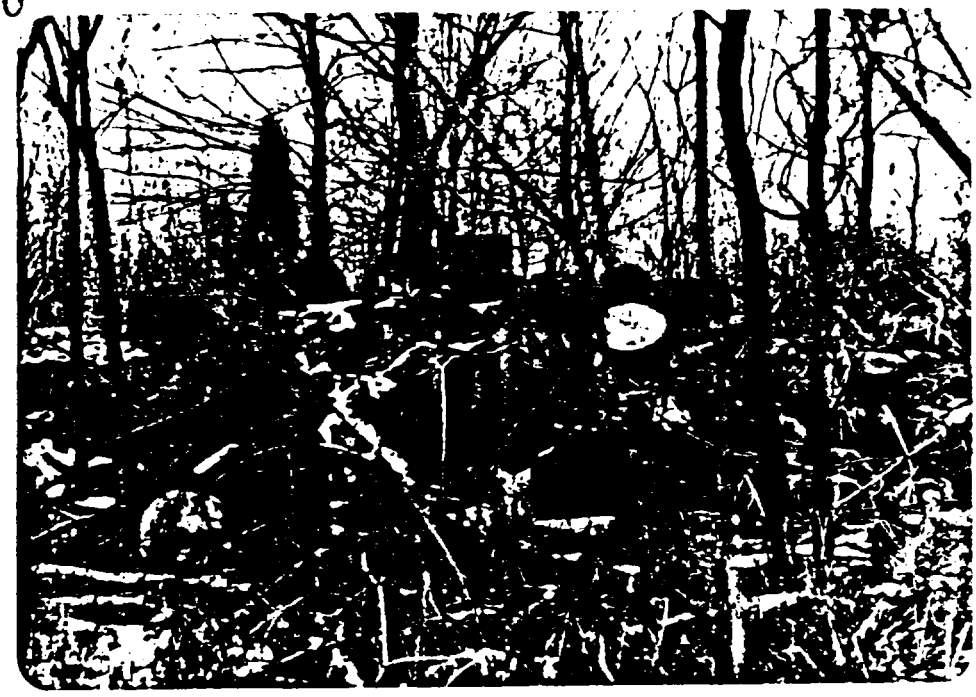


PARTIAL VIEW OF DRUMS ALONG RIVER BANK
January 14, 1981
TDD F4-8109-08A FIGURE 2.2

VIEW OF OHIO RIVER
FROM DRUM LOCATION
January 14, 1981
TDD F4-8109-08A FIGURE 2.3

were also detected, and are of chronic exposure concern. Vinyl chloride, which was detected in air monitoring, is a known carcinogen (EPA, 1975).

2.4 MITRE RANKING

The MITRE Model ranking for Lees Lane Landfill resulted in a score of 47.46 out of a maximum possible score of 100. The main high scoring elements were: (1) a known release of contaminants into the ground water, (2) a high potential for surface-water contamination, (3) a large waste quantity, (4) very toxic and persistent wastes, and (5) a known release of contaminants into the air. Copies of the MITRE ranking forms are attached as Appendix D.

2.5 SITE SECURITY

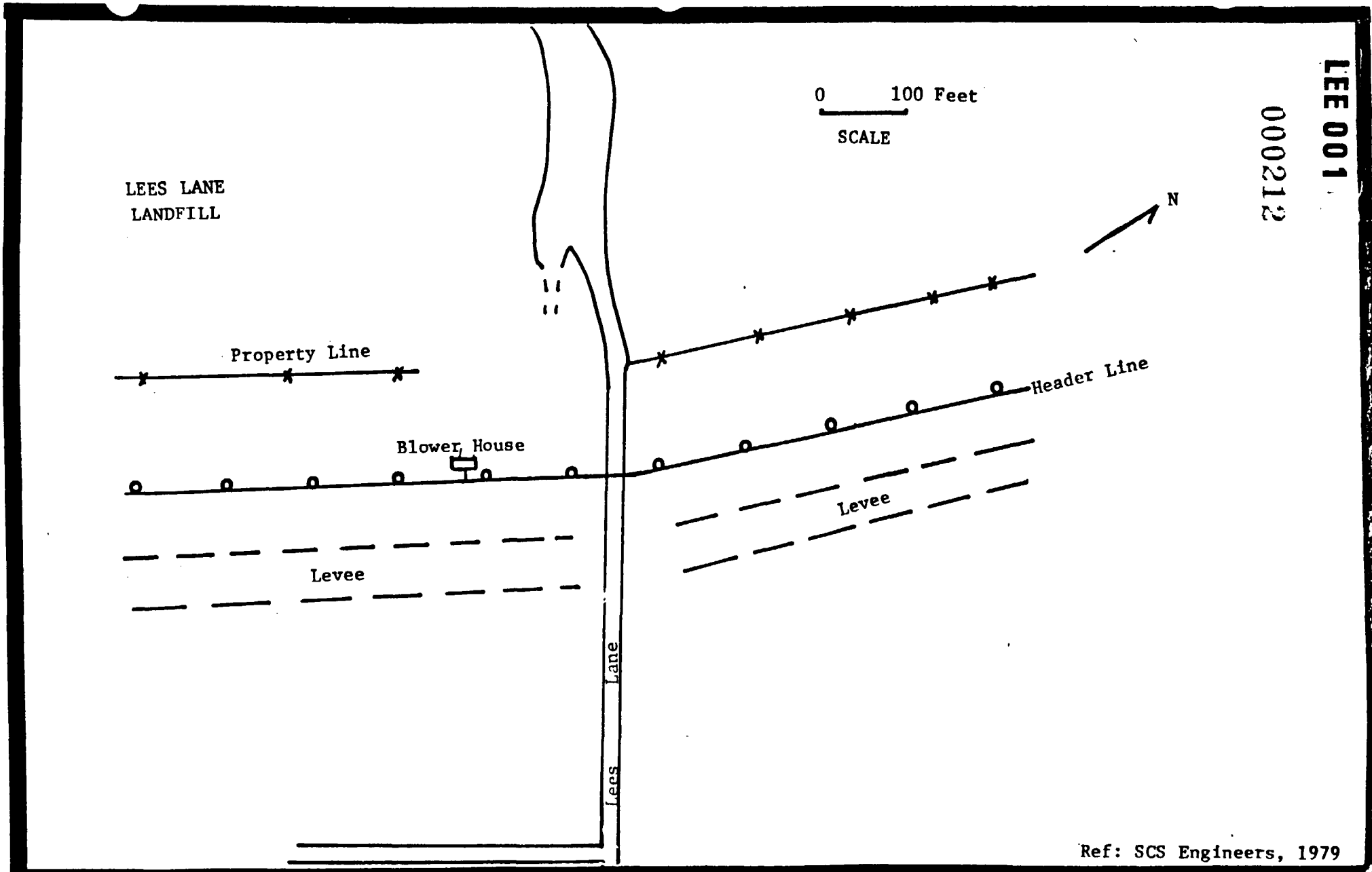
The extensive area occupied by Lees Lane Landfill creates the potential for a number of available access routes. The landfill security in no way limits entry by foot as demonstrated by the fact that the 400 drums on the river bank were first discovered by a group of hunters. Vehicular traffic is restricted on the eastern and southern sides of the landfill by the levee and by two gates erected to prevent entry onto an asphalt road that traverses the middle portion of the site. However, vehicles such as a motorcycles can circumvent one of these gates and gain site access. The adjacent industrial facilities both north and south of the site afford some degree of security for the site. Mill Creek, to the south, also serves to separate the site from nearby properties.

Since the possibility exists for personal contact of partially buried drums, minimum security measures should consist of warning signs to alert the unsuspecting or uninformed public.

2.6 EXISTING MANAGEMENT PRACTICES

There are three existing management practices at Lees Lane Landfill. The first is the venting of methane gas from the subsurface. In October 1980 Jefferson County installed a gas venting system including wells and a collection/venting system. Figure 2.4 shows the location of the wells, header pipe, and blower station. Figure 2.5 is a photograph of the blower station. The gas venting system has alleviated the methane gas migration to homes in Riverside Gardens adjacent to the landfill. (See Section 3.3 for further discussion of the air contamination problem.)

The second management practice is the removal of exposed drums of hazardous substances from the river bank. This removal was completed in



LEGEND

● Extraction Wells

ECOLOGY AND ENVIRONMENT, INC.

FIELD INVESTIGATION TEAM

REGION IV ATLANTA

LOCATION OF GAS VENT WELLS

TDD F4-8109-08A FIGURE 2.4

LEES LANE LANDFILL
GAS VENT CONTROL
STATION
January 14, 1981

October 1981 by the site executor, Mr. Ben Hardy. The empty drums and those containing sludges or solids were buried on the site as per a plan approved by the KYDNREP (Brooks, 1981). Figure 2.2 is a partial view of the drums which were along the river bank.

The third management practice is the ground-water monitoring wells which were installed in March 1981. These wells average 35 feet deep and only tap the top of the saturated zone in the vicinity of the site. The wells were not properly developed so their usefullness is limited. Sample analyses did indicate the presence of contaminants but the concentrations were elevated due to the large amount of sediment pumped from the wells. (See Section 3.2 for further discussion of the ground-water contamination problem.)

2.7 ENFORCEMENT CONSIDERATIONS

Although no EPA enforcement actions have been filed in the Lees Lane Landfill case, there have been three major actions by local and state governments. The first, in April 1975, was a temporary restraining order from the Franklin Circuit Court closing the landfill. The second, in March 1978, authorized money to fund a study of the methane gas problem. The third, in January 1981, was a Summary Judgement granted to the KYDNREP against Ben Hardy, attorney for the site owners. This final action allowed Mr. Hardy 90 days to remove the drums along the river bank. The drums were removed by October 13, 1981.

The hazard presented by the buried waste in the landfill has yet to be addressed. EPA could consider issuing either a 3013 order or filing a 7003 action against the defendents, J. H. Realty, Inc., and the Hofgesang Foundation, Inc., to force them to take appropriate action to minimize the hazard. The two defendents are, from information provided to EPA by Kentucky enforcement personnel, sufficiently solvent corporations. Both corporations are owners of the property and are represented by Ben Hardy who is also estate administrator of the now non-existent Hofgesang Sand Company.

As a result of the previously referenced state enforcement action, Mr. Hardy financed the drum removal operation. State personnel have stated that Mr. Hardy has been requested to cap the landfill and conduct ground-water monitoring at the site, but has not to this date agreed to perform these tasks. However, it will be necessary, if Superfund money is used, to send a demand letter directly from EPA to Mr. Hardy, the Hofgesang Foundation, Inc., and J. H. Realty, Inc. (Hitchcock, 1981).

2.8 STATE COORDINATION

State coordination of future work at Lees Lane Landfill has not been determined. The State may either enter into a cooperative agreement with EPA and manage remedial actions at the site or defer management to EPA. This decision will be made if and when Lees Lane Landfill is placed on the Superfund priority list of sites under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). Future investigations and enforcement actions will further determine the need for remedial response actions using CERCLA funds.

Funding of remedial actions at Lees Lane Landfill will be handled according to CERCLA Section 104. Section 104 (c) (3) states in essence that the State will contribute ten percent of the remedial action costs. These actions include all future maintenance and operations at the site. Section 104 (c) (3) further states that the State shall be granted a credit towards its share of these costs for any documented direct out-of-pocket non-federal funds expended or obligated by the State for response actions relating to a specific release after January 1, 1978 and before December 11, 1980. Should the State decide to take the lead in implementing remedial actions under CERCLA, they may accumulate additional credit for work done during the project period. However, should EPA assume the lead role in remedial implementation, the State will not receive credit for work done during the project period. Development of an agreement between EPA and the State of Kentucky is, at this time, premature due to the lack of information about the site. As the investigation progresses, the State and EPA roles will be determined, and the appropriate agreement document (cooperative agreement or memorandum of understanding) will be prepared. However, one main issue to be resolved as the investigation progresses is the involvement of enforcement actions. Enforcement actions may complicate and prolong the remedial response actions at Lees Lane Landfill (Hitchcock, 1981).

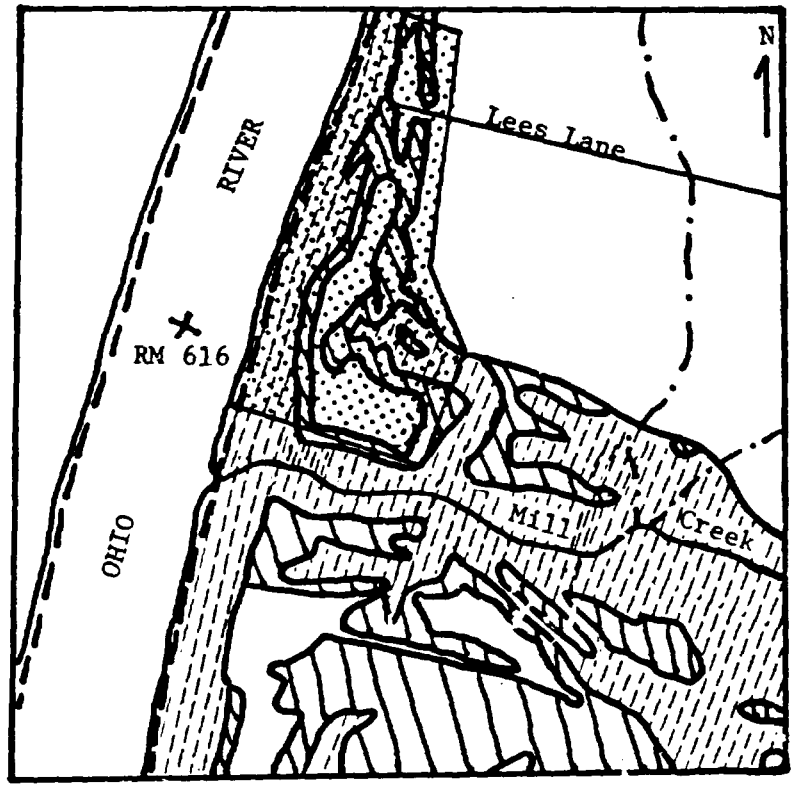
2.9 KNOWLEDGE GAPS

The knowledge gaps which exists in site background information is the location of all of the wastes in the landfill. This gap could be narrowed by conducting a magnetometer sdurvey to locate the buried metal drums and metal waste, by conducting earth resistivity surveys to locate the domestic waste fill areas and leachate plumes, and by reviewing all data from subsurface borings which have been drilled at the site.

3.1 SURFACE-WATER CONTAMINATION

Lees Lane Landfill, located in the Ohio River Drainage Basin between RM 615 and RM 616, could possibly contribute surface-water contaminants to one of the major drinking water supply sources (Ohio River) in the United States. The Cannelton Dam downstream of the site forms the pool adjacent to the site. The normal pool elevation is considered to be 383 feet msl, low-pool elevation is considered to be 374 feet msl, and flood stage is considered to be 428.2 feet msl (Figure 3.1). The river at flood stage would inundate the entire river bank of the landfill. This flood stage is reached with an average frequency of once in 1.2 years (Stanley Consultants, 1980). The designated 10-year flood level is 435 feet msl which would inundate an area approximately 500 feet landward of the river. The designated 50-year flood level is 444 feet msl which would inundate an area approximately 600 feet from the river. The designated 100-year flood level or "Intermediate Regional Flood", such as occurred in 1945, reached a level of 447.6 feet msl. This level would inundate approximately twenty-five percent of the landfill. The designated 500-year flood level of 452 feet msl approximates the Corps of Engineers Standard Project Flood which occurred in 1937 and reached a level of 30.4 feet above flood stage or 458.6 feet msl. A 500-year flood would inundate a majority of the landfill (Flood Insurance Administration, 1978). Figure 3.2 is a flood profile at RM 616 based upon topographic contours in 1960. Since the topography has been changed by excavation and fill operations the flooding will be more extensive than represented in the profile. To accurately define the flood potentials at the site a detailed topographic contour map should be made.

Surface-water contamination has not been documented at Lees Lane Landfill. However the possibilities of surface-water contamination are very good due to the erosion which has occurred on the site. Precipitation runoff has resulted in relatively deep erosional cuts along the river bank. In several cuts drums have been exposed. There is also a large catchment basin in the southern portion of the landfill as well as several smaller ponds throughout the site. These surface-water bodies could become contaminated as runoff flows across exposed waste and discharges into the ponds. In addition



Ref: USHUD, Flood Boundary and Floodway Map, 1979

LEGEND
Lees Lane Landfill
500-Year Flood Boundary
100-Year Flood Boundary
Floodway Fringe

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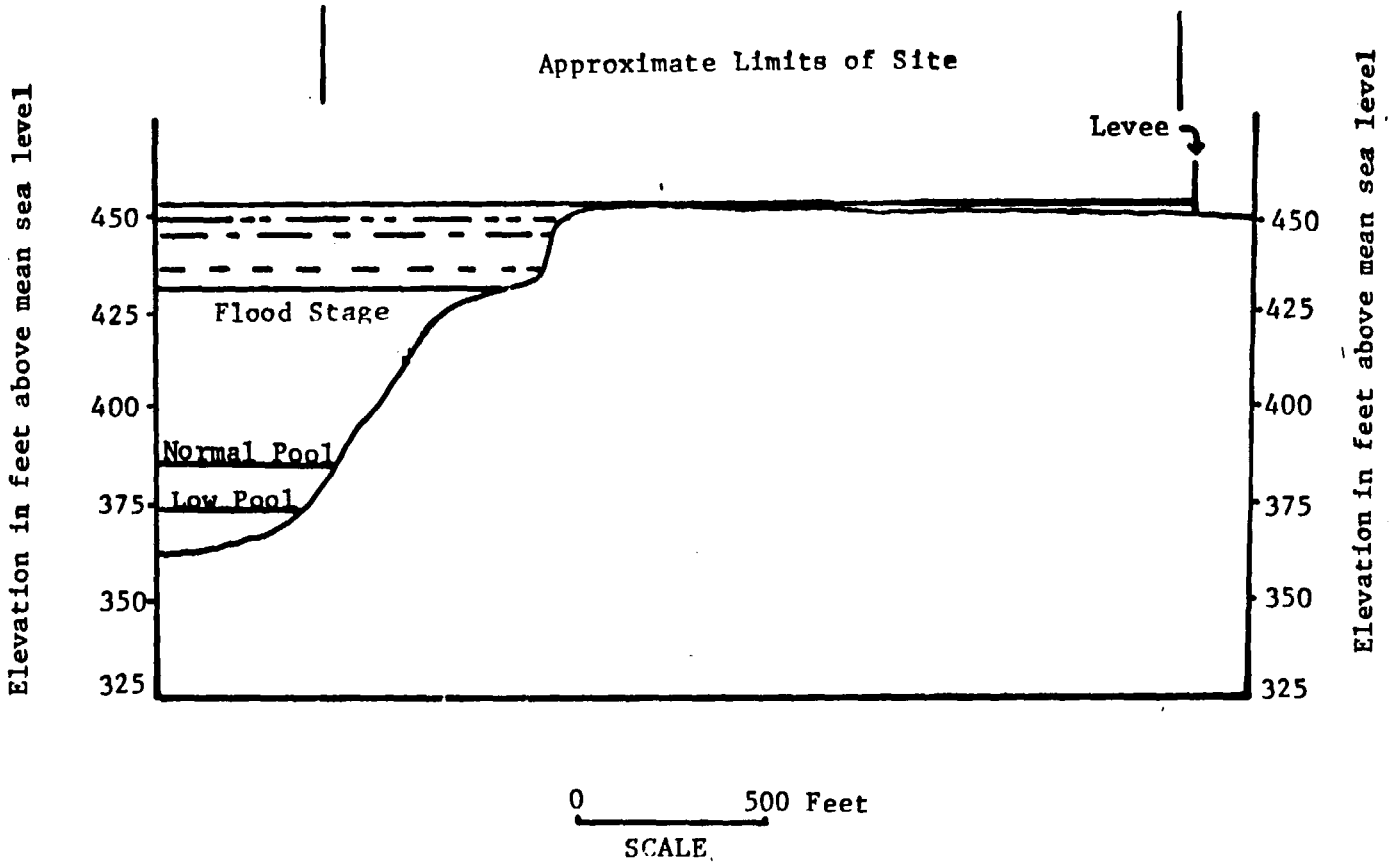
REGION IV ATLANTA

FLOOD-PRONE AREAS
IN VICINITY OF
LEES LANE LANDFILL
TDD F4-8109-08A FIGURE 3.1



Ref: Flood Insurance Administration, 1978 and
Lanesville, IN - KY USGS 7½' Quadrangle, 1960.

LEGEND
- 500-Year Flood
- 100-Year Flood
- 50-Year Flood
- 10-Year Flood

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FLOOD PROFILE
OF OHIO RIVER
AT LEES LANE LANDFILL

TDD F4-8109-08A FIGURE 3.2

these ponds add to the problem of infiltration of surface water into the subsurface thereby increasing leachate production. Leachate within the ground water would discharge into the Ohio River (See Section 3.2). The extent of leachate discharge into the river has not been defined.

3.2 GROUND-WATER CONTAMINATION

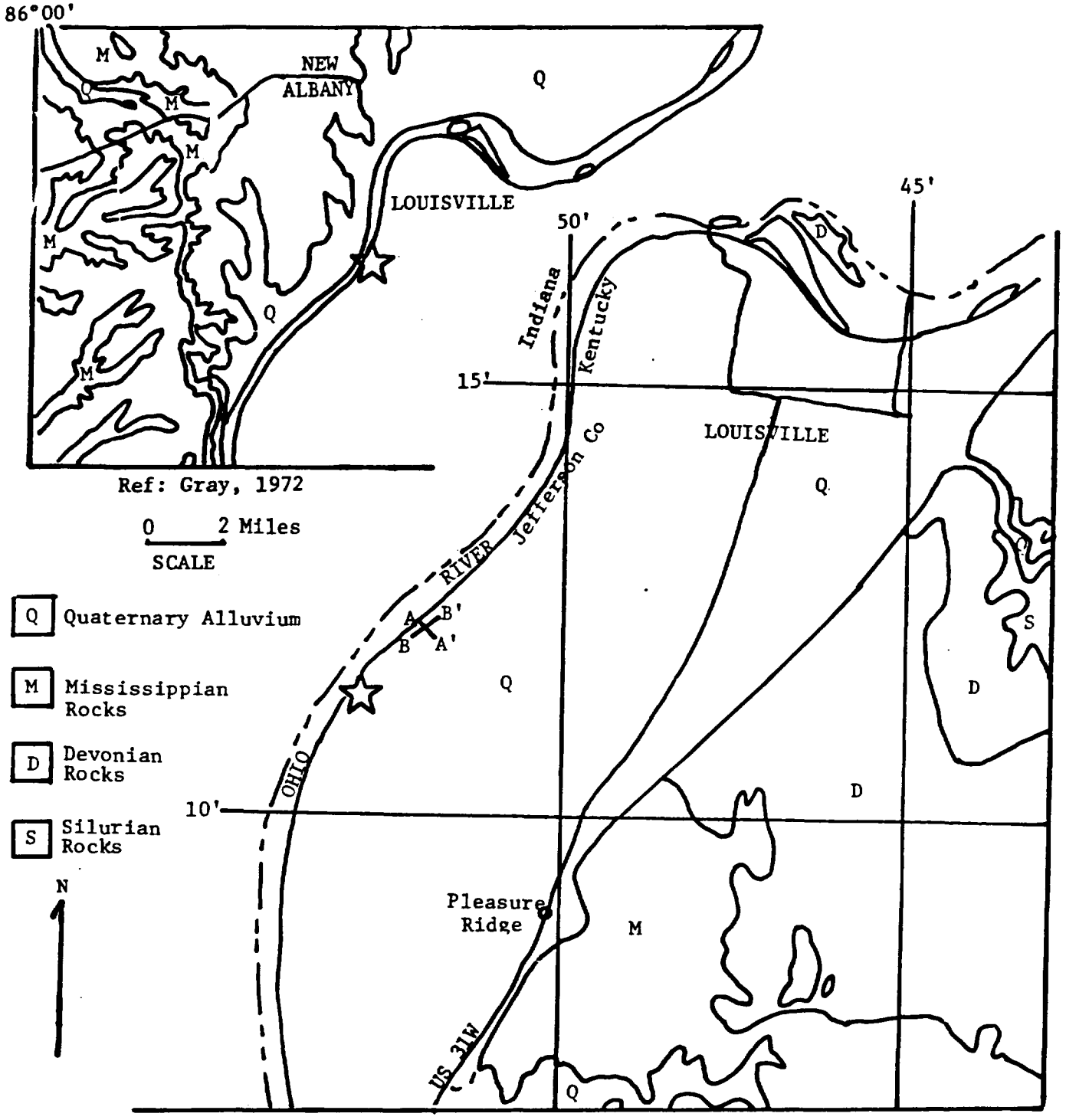
Lees Lane Landfill is underlain by the Ohio River Valley Alluvium of Quaternary age (Figure 3.3). It is approximately 130 feet thick and generally composed of 5 to 40 feet of clay, silt, and fine-grained sand overlying sand and gravel which contains clay lenses (Palmquist and Hall, 1960)., Figures 3.4 and 3.5 are generalized hydrogeologic cross sections of the Alluvium just north of the site. The New Albany Shale of Devonian age underlies the Alluvium. It is approximately 100 feet thick and dips to the west with a gradient of 40 feet per mile (Mill Creek EIS, 1980). Table 3.1 describes the general lithology and water-bearing characteristics of the selected geologic units in the area.

Ground-water availability in the area is good. The Alluvial aquifer is capable of yielding 200 to 500 gallons per minute (gpm) to most wells which penetrate the full saturated thickness of the aquifer. The New Albany Shale underlying the Alluvium may yield less than one gpm to wells which intersect fractures within the rock (Bell, 1966). Just north of the site the Alluvial aquifer has a reported transmissivity of 2,680 square feet per day near the shoreline of the Ohio River. Landward from the river the transmissivity is reported to be 6,030 square feet per day. The reported hydraulic conductivity is 134 feet per day (Price, 1964). Ground-water velocities are reported to vary between 2 feet per day and 36 feet per day (Grubb, 1970). There is good hydraulic connection between the Alluvium and the Ohio River adjacent to the site. Induced infiltration of surface water into the ground water is common and a responsive nature exists between fluctuations in the river level and ground-water levels (Bell, 1966). Ground-water levels are reported to fluctuate as much as 10 feet seasonally (Riverport EIR, 1980). In Water Year 1979 the U.S. Geological Survey observed water levels north of the site varying from 25.28 to 47.77 feet below land surface (U.S.G.S., 1980).

The potentiometric surface of the Alluvial aquifer in the vicinity of the site during 1962 is shown in Figure 3.6. The cone of depression north of the site did influence the ground-water flow direction in 1962. Figure 3.7 shows the elevations of water levels in October 1981. The cone of depression is not present.

LEE 001

000220



LEGEND

☆ Lees Lane Landfill

A——A' Cross-Section Location

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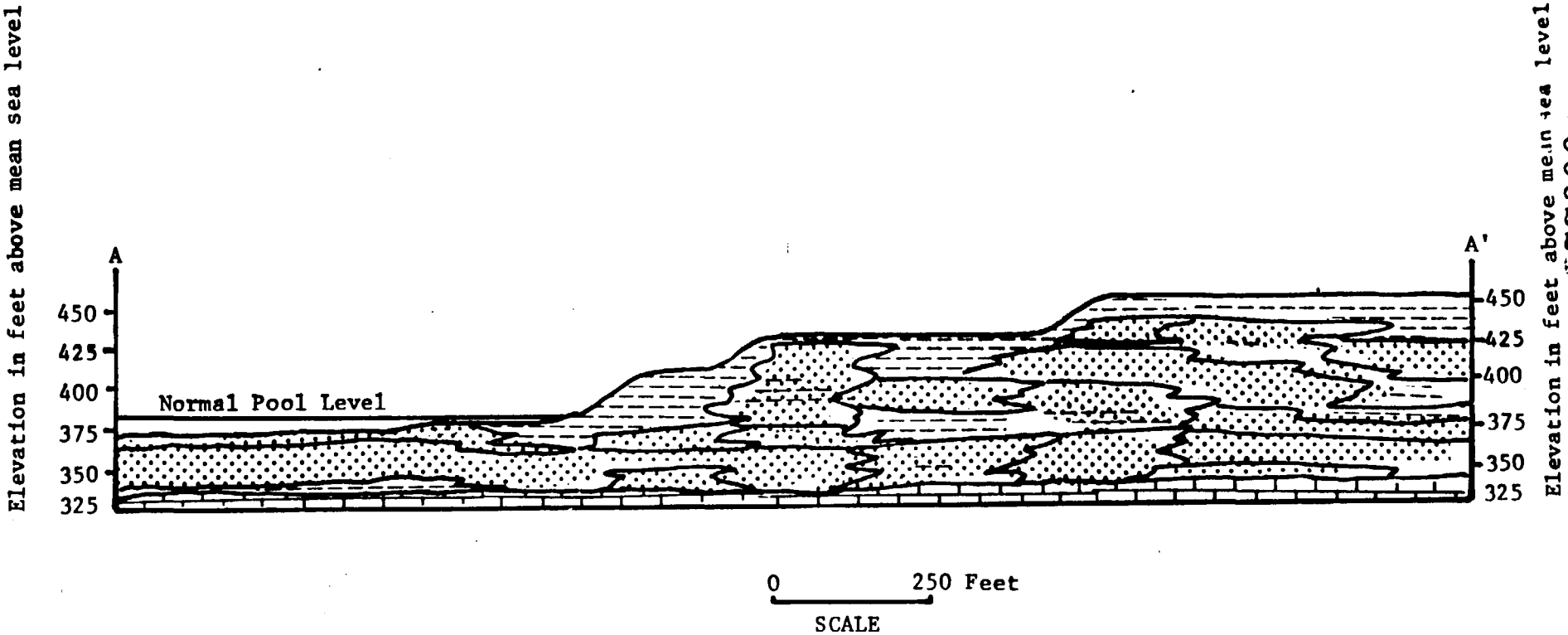
FIELD INVESTIGATION TEAM

REGION IV ATLANTA

OUTCROP MAP FOR SELECTED HYDROGEOLOGIC UNITS

TDD F4-8109-08A FIGURE 3.3



Ref: Price, 1964

LEGEND

Sand/Gravel

Clay

Bedrock

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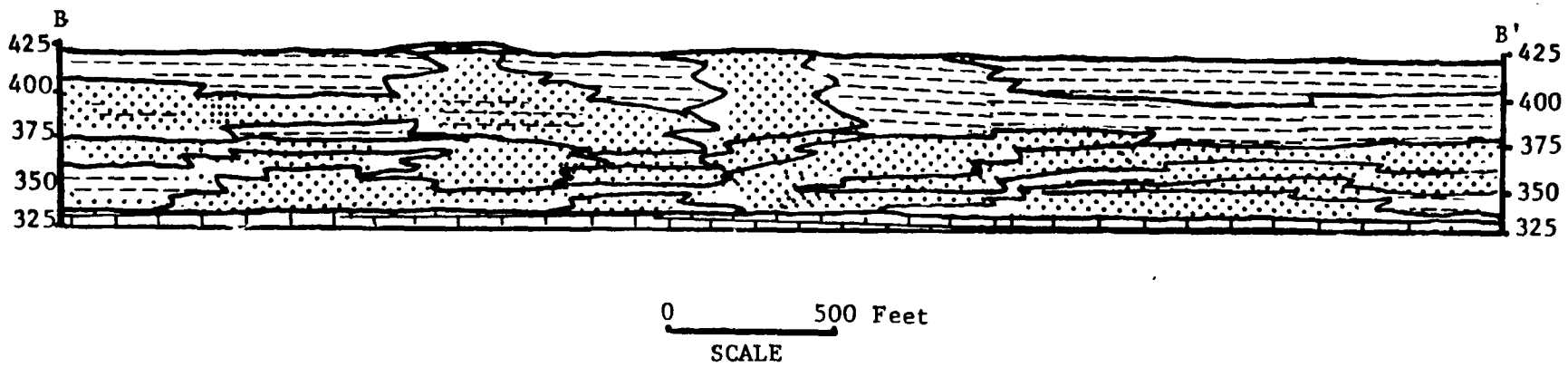
REGION IV ATLANTA

GENERALIZED HYDROGEOLOGIC CROSS SECTION A-A' PERPENDICULAR TO OHIO RIVER

TDD F4-8109-08A

FIGURE 3.4



Ref: Price, 1964

LEGEND

- Sand/Gravel
- Clay
- Bedrock

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GENERALIZED HYDROGEOLOGIC
CROSS SECTION B - B'
PARALLEL TO OHIO RIVER

TDD F4-8109-08A

FIGURE 3.5

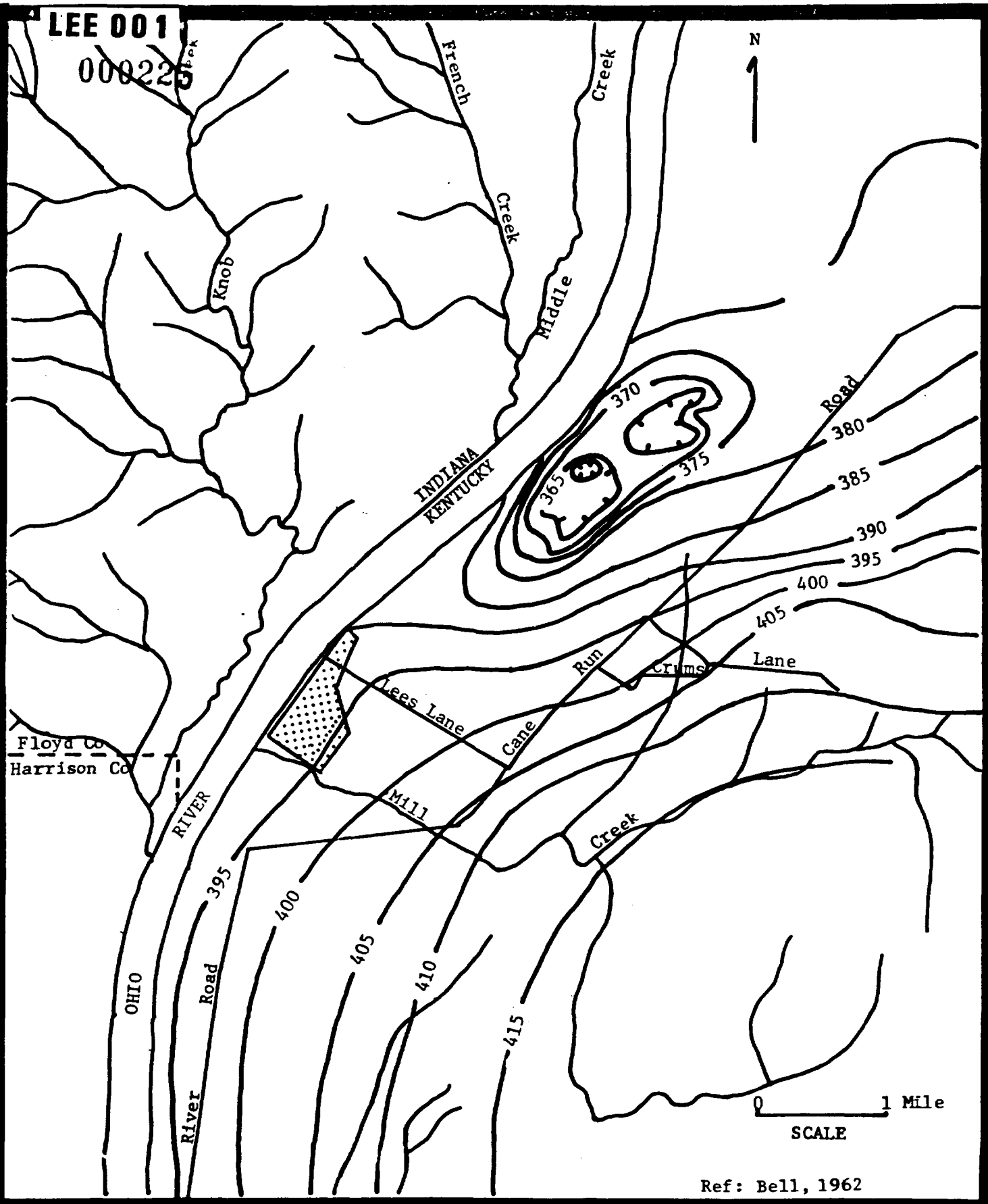
TABLE 3.1
GENERALIZED STRATIGRAPHY AND WATER-BEARING CHARACTERISTICS
OF GEOLOGIC UNITS IN VICINITY OF LEES LANE LANDFILL

SYSTEM	SERIES	GEOLOGIC UNIT	LITHOLOGY	WATER-BEARING CHARACTERISTICS
Quaternary	Pleistocene and Recent	Ohio River Alluvial Terraces	Soil, clay, cobbles, silt, fine sand; mostly alluvium; some glacial till, lacustrine, and eolian deposits. 5-130 ft. thick.	Yields of 200-500 gpm common; Furnishes domestic and industrial supplies. Water generally is hard.
Mississippian	(Lower)	Undifferentiated; may include Holtsclaw Siltstone, Nancy, Kenwood Siltstone and New Providence Shale Members of Borden Formation.	Includes siltstones and silty shale, minor sandstone, limestone, and dolomite. Variable thickness to 415 ft.	Limestone and sandstone units generally will yield domestic supplies; domestic supplies may be difficult to obtain from shales and siltstones. Water from shale is soft; from siltstone and limestone hard to very hard. May contain significant salt, sulfate or iron.
Devonian	Upper	New Albany Shale	Black, fissile, 100 ft. thick.	Yields moderate to poor; water in fractures to 40 ft. May contain high concentrations of iron, salts and sulfate.
	Middle	Sellersburg Limestone Jeffersonville Limestone	Limestone of variable character; 14 ft thick. Coarse-grained gray limestone, 20 ft thick These two formations cap highland areas.	Good domestic supplies available. Springs also utilized for domestic purposes

TABLE 3.1
GENERALIZED STRATIGRAPHY AND WATER-BEARING CHARACTERISTICS
OF GEOLOGIC UNITS IN VICINITY OE LEES LANE LANDFILL (cont)

SYSTEM	SERIES	GEOLOGIC UNIT	LITHOLOGY	WATER-BEARING CHARACTERISTICS
Silurian	Upper	Undifferentiated; may include Louisville Limestone.	Thick-bedded, dolomite, gray limestone, 40-100 ft. thick.	Principal aquifer, may be cavernous along joints and bedding planes. Yields good supplies of water; a few springs occur just above contact with underlying shale unit.

Ref: W. N. Palmquist Jr. and F. R. Hall, 1960
R. C. Kepferle, 1974
L. M. MacCary, 1956



Ref: Bell, 1962

LEGEND

—400— Water-level contour. Datum is mean sea level.

Lees Lane Landfill

ECOLOGY AND ENVIRONMENT, INC.

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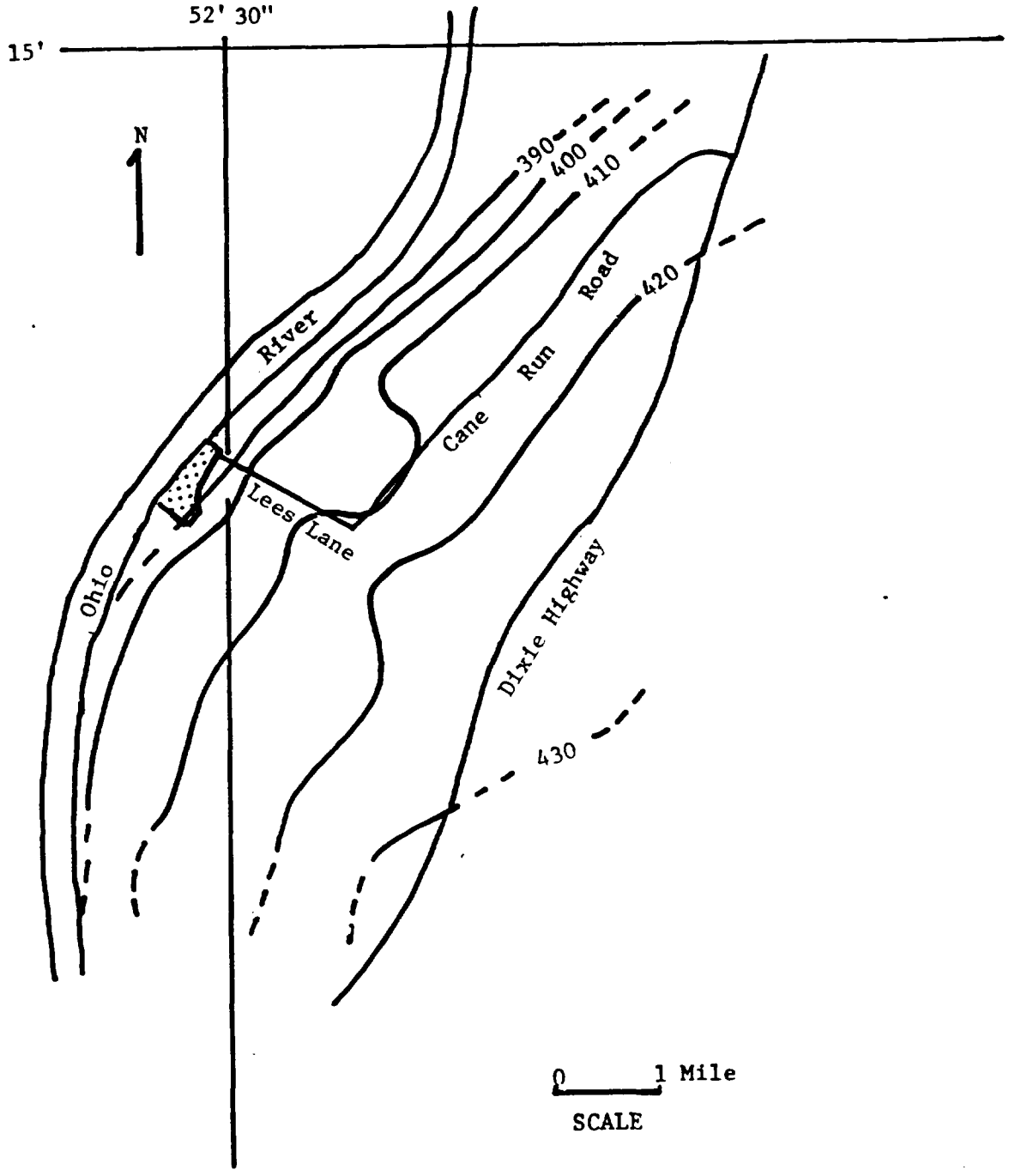
POTENTIOMETRIC MAP
IN VICINITY OF
LEES LANE LANDFILL
December 1962

TDD F4-8109-08A FIGURE 3.6

LEE 001

000226



Ref: USGS,1981

LEGEND	ECOLOGY AND ENVIRONMENT, INC.	POTENTIOMETRIC MAP IN VICINITY OF LEES LANE LANDFILL October 1981
—400— Water-level contour. Datum is mean sea level.	FIELD INVESTIGATION TEAM	
Lees Lane Landfill	REGION IV ATLANTA	TDD F4-8109-08A FIGURE 3.7

The absence of the cone of depression is a result of the decrease in ground-water use in the Louisville area. Since ground-water levels have continued to rise, the USGS has predicted basement floodings and possible structural damage to buildings in downtown Louisville (Kernodle and Whitesides, 1977). If this ground-water level rise extends to the area near Lees Lane Landfill, the ground-water will rise and increase the waste-ground-water contact. Therefore more leachate production would be expected. An additional complication of the ground-water regime is the reversal of ground-water flow during flood stages of the Ohio River. The site-specific flow patterns of the ground water underlying the site have not been defined. Additional deeper wells, as well as river level gauges and a rain gauge, would be required to properly evaluate the ground-water regime at the site.

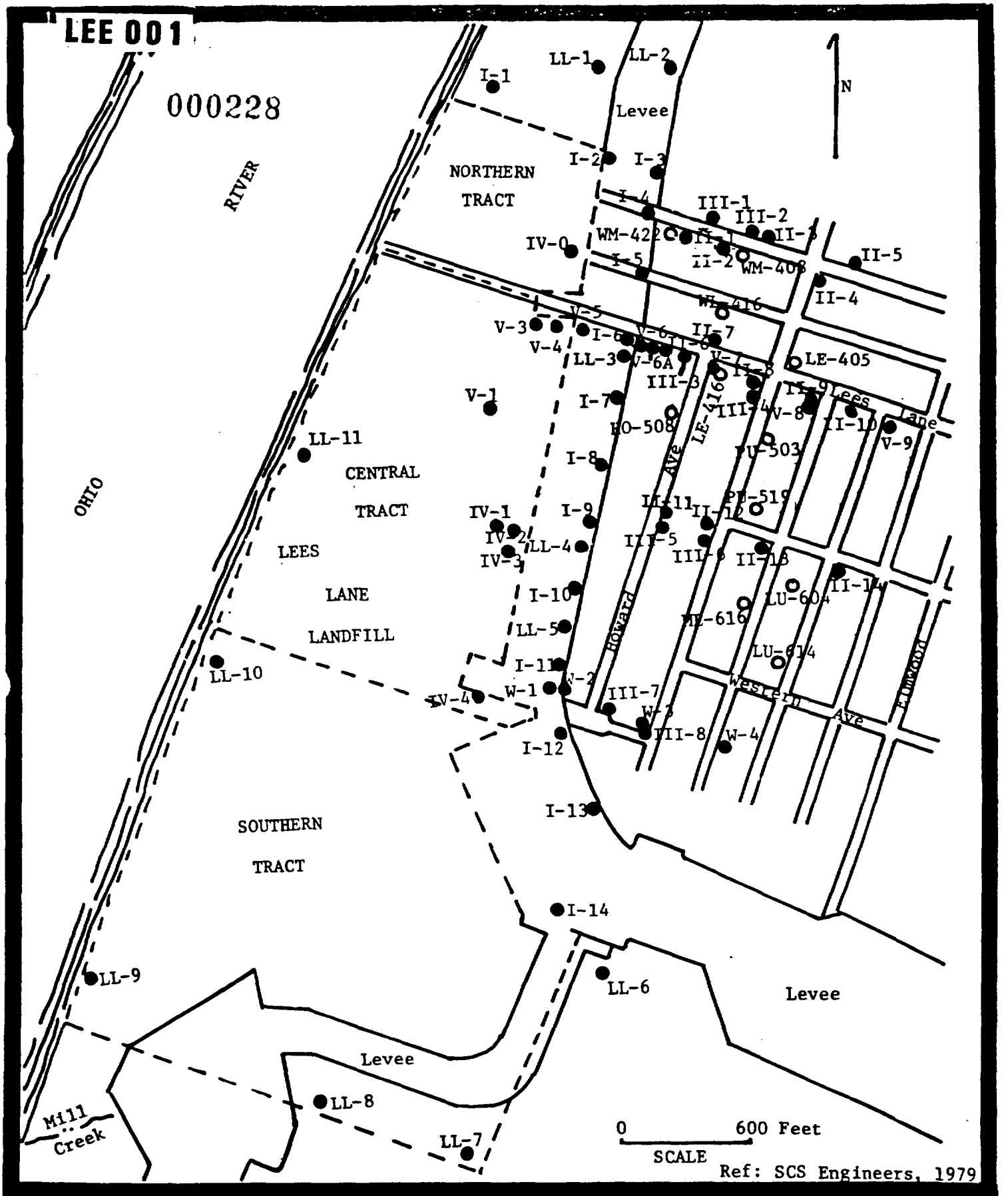
Ground-water quality in the area generally is good except where localized pollution sources exist. Relatively high nitrate concentrations in the ground water east and south of the site indicate widespread pollution from nitrate bearing waters derived from on-site septic tanks (Riverport EIR, 1980). Water in the Alluvium and shale formations is characterized as a calcium bicarbonate type (Bell, 1966).

Ground-water data from over 100 wells have been documented. Figure 3.8 shows the location of monitor wells and selected domestic wells near the site. Figure 3.9 shows the location of selected water-level observation wells in the vicinity of the site. Appendix E identifies the owners of the wells and other data.

Ground-water contamination has been documented at Lees Lane Landfill based upon EPA sampling of monitor wells in April 1981. Table 3.2 is a summary of the analytical results. The documented contamination was limited because the wells only tapped the top of the saturated zone and lacked proper construction and development. Additional deeper wells are needed to accurately define the extent of ground-water contamination and the extent of contamination reaching the Ohio River.

3.3 AIRBORNE CONTAMINATION

The first evidence of airborne contamination was on March 13, 1975 when the Jefferson County Department of Health was notified of the presence of an



LEGEND

● LL-9 Monitor well and number

○ HO-508 Domestic well and number

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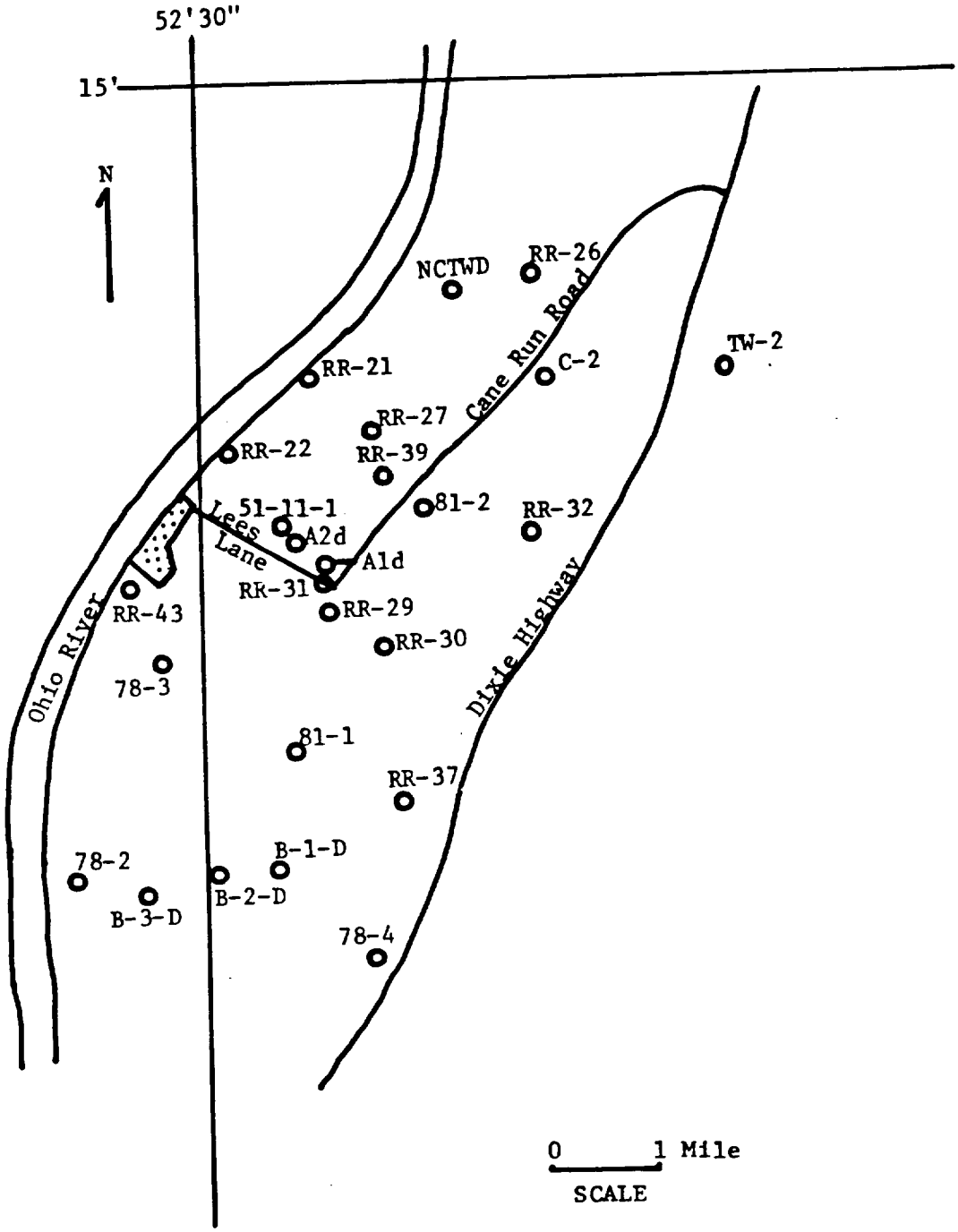
LOCATION OF SELECTED WELLS IN VICINITY OF LEES LANE LANDFILL

TDD F4-8109-08A FIGURE 3.8

LEE 001

000229



Ref: USGS, 1981

LEGEND

RR-22 Observation well and number

Lees Lane Landfill

ECOLOGY AND ENVIRONMENT, INC.

FIELD INVESTIGATION TEAM

REGION IV ATLANTA

LOCATION OF SELECTED OBSERVATION WELLS IN VICINITY OF LEES LANE LANDFILL

TDD F4-8109-08A FIGURE 3.9

TABLE 3.2
SUMMARY OF GROUND-WATER QUALITY DATA FROM
MONITOR WELLS
APRIL 1981

	Well No. LL-1 (ug/l)	LL-7 (ug/l)	LL-9 (ug/l)	LL-10 (ug/l)	LL-11 (ug/l)
ORGANIC COMPOUNDS					
Bis (2-ethylhexyl) phthalate*	—	—	—	15	—
Trichlorofluoromethane*	—	—	10K	—	—
Dichlorodifluoromethane*	—	—	10K	—	—
Phenol*	—	—	—	—	32
INORGANIC ELEMENTS					
Arsenic*	—	140	700	900	120
Boron	920	120	330	420	400
Barium	360	1,310	4,850	19,700	1,340
Beryllium*	—	—	56	168	10
Cadmium*	—	—	15	30	5
Cobalt	20	590	1,040	2,220	140
Chromium*	40	130	900	2,320	180
Copper*	120	380	1,440	2,960	220
Nickel*	80	900	1,580	3,420	280
Lead*	40	—	—	—	160
Selenium*	—	—	400	1,000	100
Tin	—	30	40	30	50
Thallium*	—	—	20	10	—
Vanadium	30	170	1,300	2,420	230
Zinc*	260	830	4,260	10,700	1,120
Mercury*	—	—	2	5	1
Aluminum	12,800	51,200	—	1,920,000	667,000
Manganese	1,910	36,100	37,600	216,000	16,800
Magnesium (mg/l)	46.3	348	482	641	64.4
Iron (mg/l)	25.8	191	1,750	5,180	297
Sodium (mg/l)	105	14.4	71.4	89.8	32.2

(*) - On NRDC list of priority pollutants
(-) - Material was analyzed for but not detected at or above the minimum detection level. The minimum detection level varies from sample to sample and parameter to parameter.
(K) - Compound was identified as present but at a concentration less than detection limits.

REF: EPA, SAD, Athens, GA, 1981

unusual gas in an area of Riverside Gardens. Flash fires were reported around water heaters. The gas was determined to be methane. In April 1975, studies conducted by EPA determined the presence of methane and vinyl chloride in monitoring and private water wells east of the site. The EPA report entitled Monitoring Near the Lees Lane Landfill in Louisville, Kentucky documented the presence of organic and industrial type gases in the monitoring wells. As a result of EPA sampling, Jefferson County contracted with Stearns, Conrad, and Schmidt Engineers to design and construct a gas venting system. The system was finally installed in March 1981 and according to the Jefferson County Works Department the system is working satisfactorily. The gas is only vented and not flared because of the possibility of toxic fumes as a byproduct of combustion. Jefferson County presently samples the gas venting system monthly (Robinson, 1981). Appendix F is a summary of the air quality data gathered at Lees Lane Landfill. Table 3.3 is a summary of the exotic gas analyses.

3.4 FIRE AND EXPLOSION HAZARDS

The first occurrence of a fire and explosion hazard was related to the presence of explosive levels of methane gas in March 1975. Seven families were evacuated along Putman Street in Riverside Gardens as a result of this hazard.

The second occurrence of a fire and explosion hazard was related to the 400 exposed drums along the river bank. Sampling of the drum contents resulted in flash point determinations ranging from 77°F to greater than 150°F (KYDNREP, 1980). The contents were pumped out and removed in October 1981.

The presence of other buried drums containing low flash point substances remains a distinct possibility. Any action at Lees Lane Landfill dealing with excavation or drilling operations must first deal with the prevention of fire and explosion hazards. Safety procedures for such contengencies must be thoroughly addressed.

3.5 POPULATION AFFECTED

In terms of the surface-water contamination potential the population which may be affected involves a large number of people who use the Ohio River downstream as a source of water supply. The two factors which would determine the degree of contamination are the concentrations of contaminants which might enter the river via additional exposed drums and the dilution factor once the contaminants enter the river. The dilution and travel time of contaminants

TABLE 3.3
EXOTIC GAS ANALYSES*

	U.S. EPA 3/19/75 to 3/30/75				SCS Engineers 12/1/78				SCS Engineers 5/3/79				Composite (all 3 sets)			
	Mean	Min.	Max.	An[1]	Mean	Min.	Max.	An[1]	Mean	Min.	Max.	An[1]	Mean	Min.	Max.	An[1]
Benzene	15	15	15	1	8.8	0.1	29.5	6	6.0	0	45.8	8	7.7	0	45.8	15
Butane	—	—	—	0	—	—	—	0	—	—	—	0	—	—	—	0
Butene	30	30	30	1	—	—	—	0	—	—	—	0	30	30	30	1
Butane/Butene	—	—	—	0	8.6	0	17.7	6	0.3	0	1.8	8	3.9	0	17.7	14
Chlorobutene	—	—	—	0	3.7	0.1	14.7	6	1.4	0	10.8	8	2.4	0	14.7	14
Chloroethane	1	1	1	1	—	—	—	0	—	—	—	0	1	1	1	1
Cyclohexane	5	5	5	1	0	0	0	6	3.1	5.6	19	8	2.0	0	19	15
Dichlorodiflouro-methane (freon)	—	—	—	0	0	0	0	6	10.9	0	25.7	8	6.2	0	25.7	14
Dichloroethane	22.5	22.5	22.5	1	9.1	0.8	22.7	6	1.9	0	14.9	8	6.2	0	22.7	15
Dichloroethene	40	40	40	1	—	—	—	0	—	—	—	0	40	40	40	1
Dimethylcyclohexane	—	—	—	0	0	0	0	6	—	—	—	0	0	0	0	6
Ethylebenzene	27.5	27.5	27.5	1	12.0	8.6	16.6	6	0.3	0	2.0	8	6.2	0	27.5	15
Ethylene	—	—	—	0	—	—	—	0	2.2	0	9.2	8	2.2	0	9.2	8
Heptane	15	15	15	1	0.03	0	0.1	6	—	—	—	0	2.2	0	15	7
Heptene	20	20	20	1	0	0	0	6	—	—	—	0	2.9	0	20	7
Hexane	15	15	15	1	10.3	0	36.8	6	1.8	0	6.7	9	5.8	0	36.8	16
Isobutane	10	10	10	1	1.8	0	11.0	6	1.6	0	10.8	8	3.1	0	11.0	15
Methylcyclopentane	5	5	5	1	0	0	0	6	—	—	—	0	1.0	0	5	7
Toluene	175	175	175	1	12.2	0.1	23.6	6	0.8	0.7	5.7	8	17.0	0.1	175	5
Vinyl Chloride	6.7	0.0005	51	20	50.5	17.4	134	15	37.0	0	188	9	27.8	0	188	44
Xylene	45	45	45	1	4.7	0	10.7	6	—	—	—	0	10.5	0	45	7
1,3 Butadiene	3	3	3	1	—	—	—	0	—	—	—	0	3	3	3	1

*All entries in ppm except for no. of analyses

AN[1] = Number of Analyses

REF: SCS Engineers, 1979

within the river has not been determined. The possibility of erosion exposing additional drums is very good due to the lack of proper erosional control structures on the site. If surface-water contamination is deemed imminent, then a river study and contingency plan should be prepared by those local, state and federal agencies involved with the protection of surface-water bodies.

In terms of documented ground-water contamination, the population affected involves a limited number of people who may still be using their domestic wells east of the site. The ground-water flow direction is reversed from the normal westward flow during times when the river is above its normal levels. The industrial area north of the site is also a potential receptor of contaminated ground water. The cone of depression within the Alluvial aquifer did influence the ground-water flow direction for many years.

The leachate plume may have moved close to the industrial wells (See Section 3.2). Therefore the industrial population may be affected by the release of volatile organics in the processes at the plants. An assessment of this problem has not been made. Since a complete ground-water contamination assessment has not been made of Lees Lane Landfill, the population affected by the ground-water contamination cannot be determined accurately.

In terms of airborne contamination there are approximately 1,470 people within a one-mile radius who may be affected (Appendix D). The major airborne contamination problem has been alleviated by the gas venting system, but the possibility exists for gases such as vinyl chloride to escape to the atmosphere. A complete analysis of the gases should be made to determine what types and concentrations of gases are being vented.

In terms of the fire and explosion hazard affecting people, the possibilities are limited. Since all of the hazardous substances are buried or partially buried only excavations or drilling would pose a threat.

3.6 ENVIRONMENT AFFECTED

The affected environment involves vegetation, wildlife and fish. In such a large landfill with a large amount of hazardous waste in close proximity to a large body of water the environment cannot escape exposure. An assessment of the degree of harm to the environment has not been made.

3.7 KNOWLEDGE GAPS

The knowledge gaps which exist in the hazard assessment are: first, the extent of ground-water contamination; second, the location of wastes in relation to probable erosional cuts leading to direct contaminant entry into the Ohio River; and third, the complete analysis of gases which are vented to the air. Since the monitor wells installed in March 1981 are of limited and questionable use, additional wells are needed to completely assess the extent of ground-water contamination (See Section 4.2). The potential for surface-water contamination exists by ground-water discharge and where wastes have been exposed by erosion. These areas should be identified and erosional control structures should be installed (See Section 4.3). The airborne contamination problem, partially solved by venting the methane, may still pose a health hazard due to the other toxic gases such as vinyl chloride which may be vented along with the methane. A complete gas analysis should be conducted to determine the hazard assessment.

4.1 IMMEDIATE REMOVAL

Presently there are no major immediate removal actions which are required at Lees Lane Landfill. However, due to the flood potential at the site, additional drums of hazardous waste may become exposed. If and when this exposure occurs, an immediate removal action would be warranted. Mapping of the erosional cuts on the site and removal of buried drums from these erosional features is recommended to prevent a recurrence of the Ohio River contamination hazard. In addition, a limited number of warning signs should be placed at possible access points along the site boundary to warn people of the potential hazards on the site. The warning signs, approximately twenty in number, could be installed for less than $1,000. The design of this sign could be similar or identical to that used at the North Hollywood Dump Site, Memphis, Tennessee.

4.2 FURTHER FIELD INVESTIGATIONS

Further field investigations needed at Lees Lane Landfill are the location of buried wastes, a determination of the extent of ground-water contamination, and a complete analysis of the gas vented to the air.

The location of buried wastes can be accomplished by using direct observations on the site and surface geophysical methods. Direct observations should include identification, mapping, and surveying of exposed wastes in relation to erosional features. These wastes could cause direct contamination of the Ohio River. The surface geophysical methods should include earth resistivity and magnetometer surveys. These two surveys will identify metal and nonmetal wastes as well as define the subsurface stratigraphy. The above surveys are in-house capabilities of EPA and the Field Investigation Team (FIT) contractor. These surveys would take three people approximately eight weeks to complete.

Once the buried wastes have been identified and the stratigraphy has been defined, a series of test wells should be drilled to sample the subsurface and ground water. These test wells are recommended to define the horizontal and vertical extent of ground-water contamination. A typical test well would consist of advancing the hole using hollow stem augers. Split spoon samples or cores would be taken at selected intervals. Based upon the resistivity cross sections the auger advancement would cease at a given depth and a ground-water sample would be obtained. Then the hole would be advanced to the

next lower zone from which a sample would be obtained. Once the auger reached bedrock, a natural gamma ray log would be run through the center of the hollow stem auger. This log would detail any clay and sand lenses present in the well, assist in determining permanent well screen lengths, and enhance the stratigraphic control of the subsurface. Once the log is complete the hole would be plugged with bentonite and cement. The estimated cost of installing twenty temporary test wells is $70,000. Approximately four weeks will be necessary to complete the wells. The data from the test wells will enable the investigator to properly assess the ground-water contamination problem. The temporary test well approach is recommended over initial permanent well installations due to the lack of hydrogeological data and the estimated cost of $200,000 for approximately 60 permanent wells. Once the data has been analyzed, locations and depths of permanent monitor wells can be properly identified. Additional hydrologic work such as surface-water sampling, rainfall and stream gauging is recommended.

The final field investigation effort should assess the airborne contamination problem. This can be accomplished by sampling the gases from the gas vent system and analyzing them for toxic gases. This sampling should be on a quarterly basis for one year unless high concentrations are found. Then the sampling interval should be changed to monthly. The estimated cost of one analysis is $500.

4.3 REMEDIAL RESPONSE ALTERNATIVES

The remedial response alternatives which could be used to "close out" Lees Lane Landfill must be based upon the proposed future use of the land and the ground water in the vicinity of the site. If the land and ground water are not to be used in the future then a limited remedial response is all that is necessary. If on the other hand, the land and ground water is to be used in the future, then a total closure effort should be included in the remedial responses. These two alternatives appear to be the most attractive based upon the present knowledge of the site. As data is obtained other alternatives may be considered. For example, if Ohio River contamination is determined to be from ground-water discharge, then a leachate removal system would be necessary in either approach. Other alternatives such as waste removal, leachate pumpage and treatment, in-situ treatment, and ground-water containment were considered but their feasibility and costs would probably prohibit their use.

000237 The first approach assumes no future land or ground-water use. It would include a minimal ground-water monitoring program and a landfill cap with erosional control structures. This minimal monitoring program would monitor both upgradient and downgradient directions of ground-water flow. The estimated cost of ten monitoring wells is $50,000. The cap and erosional control structures would be constructed to prevent rainfall infiltration and flood erosion. The estimated cost of these two items is $8.75 million (JRB Associates, Inc., 1980). The total estimated cost of the first approach is $8.8 million.

The second approach assumes future land and ground-water use. It would include extensive ground-water and surface-water monitoring to establish historical data as well as hydrological testing of the Ohio River-Alluvial aquifer hydraulic connection to determine the design needs of a leachate control and removal system. Cooperative agreements could be made with the U.S. Geological Survey for this work. The leachate could possibly be disposed into a deep well injection system. This system would include three basic components which would be a network of leachate extraction wells, a limited treatment/filtration station, and an injection well. Shallow and deep well monitor wells would be installed as required by the subsurface conditions and by the Underground Injection Control Program for Class I wells. The leachate extraction wells would be twelve-inch diameter wells placed at strategic locations throughout the landfill to control ground-water movement and to extract lechate. Water from the wells would be piped to a limited treatment/filtration station which would treat and filter the water as necessary to prevent incompatible mixtures in the injection zone and to prevent clogging of injection zone screens and porous formation zones. Once treated and filtered the water would be pumped to the injection well. This well would be approximately 3,500 feet deep and might consist of seven-inch diameter tubing inside ten-inch diameter casing. The landfill would be protected from flooding by a levee on the bank of the river and capped as in the first approach. The estimated cost of 60 monitoring wells is $200,000. The estimated cost of the levee is $2 million, the landfill cap with gas vent wells throughout the landfill, $9 million; the ground-water extraction system with ten pumping wells, $500,000; the deep well injection system, $2.5 million. The total estimated cost of the second approach is $14.2 million.

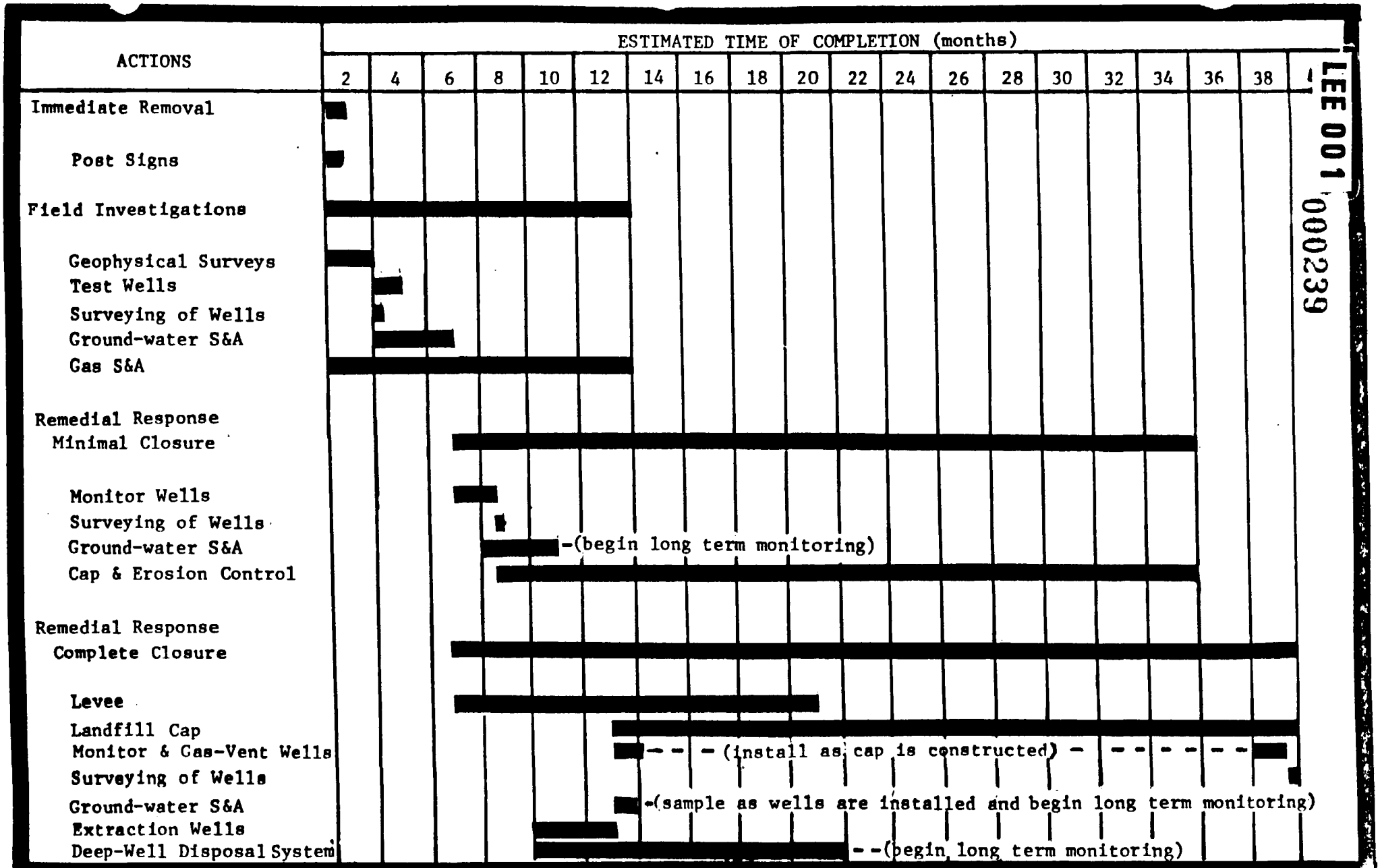
4.4 MASTER SCHEDULE

The projected implementation schedule for all recommended actions at Lees Lane Landfill is outlined in Table 4.1. All actions except long term monitoring could be completed in about three years. Within the Remedial Approach Flow Chart (Table 4.2) Lees Lane Landfill is presently within section G, Field Investigation. Without the recommended field investigation work as described in Section 4.2, a feasibility study to determine which alternative is suitable cannot effectively be prepared. The needed additional information will detail geological as well as hydrological data and will identify waste locations.

4.5 KNOWLEDGE GAPS

The primary knowledge gap needed to complete the recommendations for further action is the lack of site-specific hydrogeologic data. Needed are data to define the stratigraphy, lithology, aquifer characteristics such as transmissivity, hydraulic conductivity, seepage velocity, surface-water to ground-water connections, infiltration, leachate plume dimensions and water-level fluctuations. This information is needed to thoroughly define the site conditions and to properly plan the feasibility studies and remedial actions.

Other knowledge gaps are the location of wastes at the site and a complete analysis of the gases which are being vented to the atmosphere. These two gaps can easily be filled by in-house capabilities of EPA and the FIT contractor.



LEE 001 000239

LEGEND

S & A Sampling and Analysis

ECOLOGY AND ENVIRONMENT, INC.

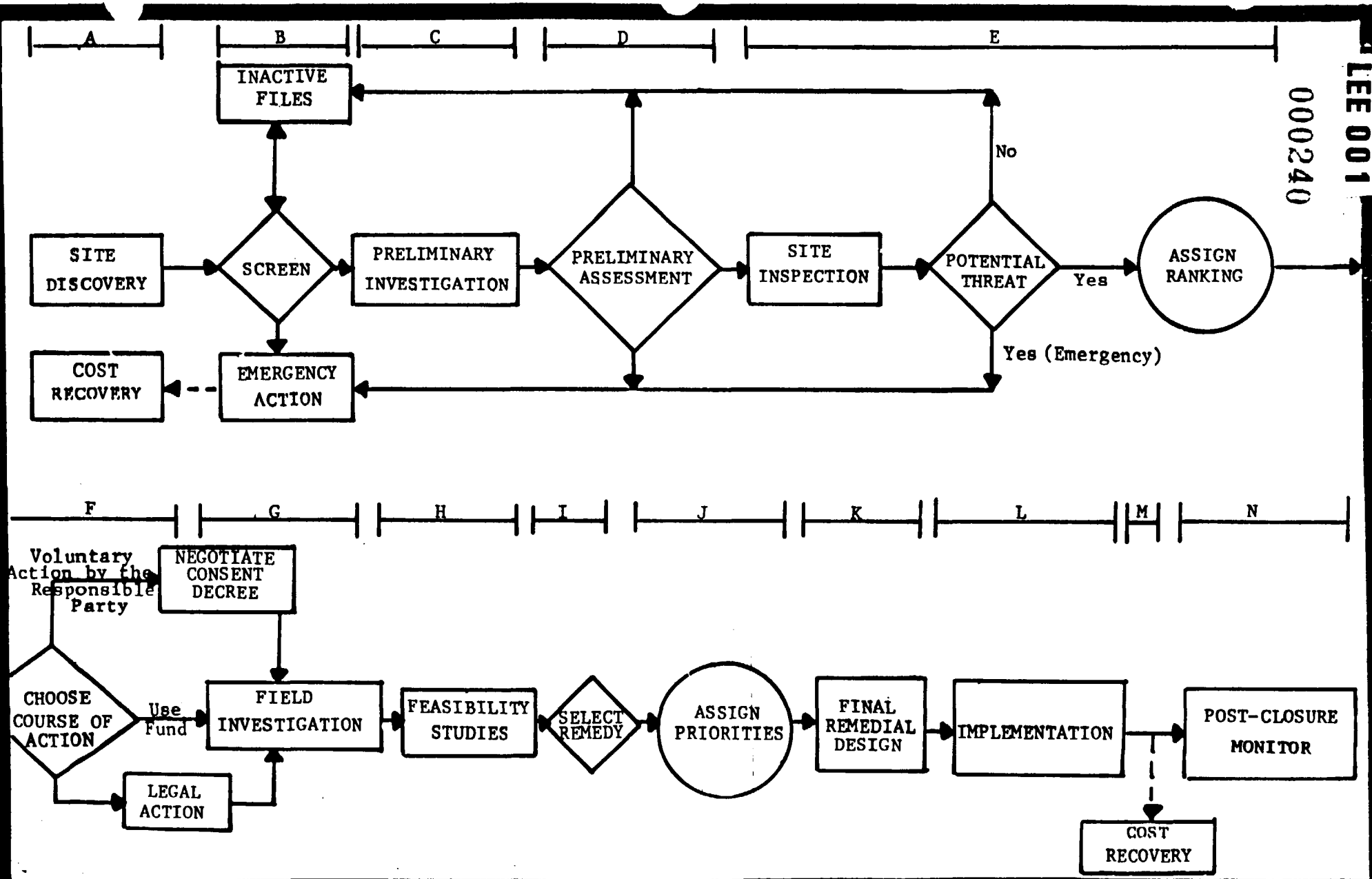
FIELD INVESTIGATION TEAM

REGION IV ATLANTA

IMPLEMENTATION SCHEDULE
FOR
REMEDIAL APPROACH PLAN
AT
LEES LANE LANDFILL

TDD F4-8109-08A

TABLE 4.1



Ref: Environmental Protection Agency October 28, 1980	ECOLOGY AND ENVIRONMENT, INC. FIELD INVESTIGATION TEAM REGION IV ATLANTA	REMEDIAL APPROACH FLOW CHART TDD F4-8109-08A TABLE 4.2

SECTION 5 - SUMMARY AND ESTIMATED COSTS

Recommended further actions for Lees Lane Landfill include limited immediate removal action, extensive field investigations, and remedial response actions dependent upon land use and water resource planning. The recommended immediate removal action is to install a limited number of warning signs to warn would-be trespassers. Also an emergency action may be warranted if additional drums of hazardous substances are exposed by erosion or flooding.

The recommended field investigations include the location of wastes, a determination of the extent of ground-water contamination, and a complete analysis of the vented gases. These recommendations are necessary due to the lack of data on the site and the need for knowledge to properly plan feasibility studies and remedial response actions.

The recommended remedial response actions are based upon two assumptions. These assumptions are (1) no future land or ground-water use of Lees Lane Landfill and (2) future land or ground-water use. A limited closure plan and ground-water monitoring plan is recommended if no use is planned. A complete closure is recommended if use is planned. Below is a summary of the estimated costs of the above recommendations. These costs are assumed to be reliable within a range of plus or minus 50 percent.

Action	Estimated Cost
Immediate Removal	
Warning Signs	$ 1,000
TOTAL	$ 1,000
Field Investigations	
Waste Location	(In-house capability)
Temporary Test Wells	$70,000
Gas Analyses (1 year)	$ 2,000
TOTAL	$72,000
Remedial Responses	
Minimal Closure	
10 Monitor Wells	$50,000
Landfill Cap and Erosional	
Control Structures	$8,750,000
TOTAL	$8,800,000

Complete Closure

60 Monitor Wells	$200,000
Levee	$2,000,000
Cap with Gas-Vent Wells	$9,000,000
Ground-water Extraction System (10 Wells)	$500,000
Deep Well Injection	$ 2,500,000
TOTAL	$14,200,000

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APPENDIX A

Analyses of Drum Samples

Lees Lane Landfill

LEE 001

000246 THE FOLLOWING COMPOUNDS WERE IDENTIFIED IN THE SAMPLE:

GUANTITATION REPORT FILE: SEVEN

DATA: SEVEN.TI
04/09/80 8:29:00
SAMPLE: DRUM SAMPLE NO. 7...LEE'S LANE LANDFILL
CONDS.: SP-1000, 5MIN HOLD AT 100, 220 @ 1.5 DEG/MIN
FORMULA: INSTRUMENT: FINN WEIGHT: 0.000
SUBMITTED BY: DHM ANALYST: MILES ACCT. NO.:

AMOUNT=AREA * REF.AMNT/(REF.AREA* RESP.FACT)

%TOT	NO	NAME
0.02	1	CYCLOPENTANE, METHYL-
0.02	2	PENTANE, 3-ETHYL-2, 2-DIMETHYL-
0.04	3	BENZENE
0.01	4	BICYCLO\2.2.2\OCTANE
0.08	5	BICYCLO\3.2.1\OCTANE
0.04	6	HEXANE
0.04	7	CYCLOHEXANE, METHYL-
0.01	8	CYCLOPENTANE, 1, 2-DIMETHYL-, TRANS-
0.17	9	PENTALENE, OCTAHYDRO-, CIS-
0.02	10	HEXANE, 3-METHYL-
0.00	11	CYCLOHEXANE, 1, 3-DIMETHYL-, CIS-
0.10	12	3-NONYNE
0.06	13	PENTALENE, OCTAHYDRO-2-METHYL-
3.63	14	BENZENE, METHYL-
3.63	15	BENZENE, METHYL-
0.02	16	CYCLOHEXANE, 1, 3-DIMETHYL-, TRANS-
7.42	17	PENTALENE, OCTAHYDRO-2-METHYL-
0.82	18	BENZENE, 1, 3-DIMETHYL-
0.05	19	BENZENE, 1, 3-DIMETHYL-
0.37	20	CYCLOHEXANE, 1-ETHYL-1-METHYL (TENTATIVE)
1.73	21	CYCLOHEXANE, 1-METHYL-4-(1-METHYLETHYLIDENE)-
0.79	22	9-OCTADECEN-1-OL, (Z)-
0.61	23	BENZENE, (1-METHYLETHYL)-
0.38	24	OCTANE
3.77	25	CYCLOHEXANE, PROPYL-
2.76	26	CYCLOHEXANE, PROPYL-
0.89	27	BENZENE, 1, 4-DIMETHYL-
2.21	28	BENZENE, PROPYL-
1.72	29	OCTANE, 4-METHYL-
6.78	30	OCTANE, 3-METHYL-
4.98	31	OCTANE, 2-METHYL-
7.20	32	2, 3-HEPTADIEN-5-YNE, 2, 4-DIMETHYL-
3.74	33	CYCLOHEXENE, 1-(1-PROPYNYL)-
0.88	34	NONANE
0.37	35	NONANE, 3-METHYL-
3.54	36	OCTANE, 2, 7-DIMETHYL-
5.73	37	BENZENE, 1, 3-DIETHYL-
2.49	38	DECANE
3.54	39	BENZENE, 1, 3, 5-TRIMETHYL-
9.29	40	NONANE, 3-METHYL-
3.34	41	NONANE, 2-METHYL-
7.16	42	BENZENE, 1, 3, 5-TRIMETHYL-
1.12	43	BENZENE, 1, 2, 4-TRIMETHYL-
1.09	44	DECANE
0.20	45	BENZENE, 2-ETHYL-1, 4-DIMETHYL-
0.11	46	BENZENE, 2-ETHYL-1, 4-DIMETHYL-
	47	BENZENE, 2-ETHYL-1, 4-DIMETHYL-

Sample No. 7
Ref: EPA Files

LEE 001

000247

RESULT

THE FOLLOWING COMPOUNDS WERE IDENTIFIED IN THE SAMPLE.

SCAN NO.	COMPOUND	RESULT BY WT
85	2-PENTANONE, 4-METHYL	0.35
134	2-PROPANONE	0.26
157	UNKNOWN	0.03
168	UNKNOWN (HYDROCARBON)	0.02
191	2-PENTANONE, 3-METHYLENE-	0.05
✓197	METHYL BENZENE	0.02
✓216	PHENOL	8.43
277	PENTALENE, OCTAHYDRO-2-METHYL-	0.02
✓311	ETHYL BENZENE	0.80
355	CYCLOHEXANE, (1-METHYLETHYL)-	0.03
✓380	BENZENE, (1-METHYLETHYL)-	1.67
434	CYCLOHEXANE, PROPYL-	0.20
468	PHENOL, 2-METHYL-	4.46
✓478	BENZENE, DIMETHYL	1.66
✓496	PHENOL, 2-METHYL	7.30

* INDICATES TENATIVE IDENTIFICATION

** INDICATES NO QUANTITATION

Sample No. 9
Ref: EPA Files

LEE 001

000248

Scan No.	Compound	Percent by Wt.
519	PHENOL, METHYL	0.36
582	1,1'-BICYCLOPENTYL	0.24
615	2,3-HEPTADIEN-5-YNE, 2,4-DIMETHYL	9.95
645	PHENOL, 4-ETHYL-	7.39
669	PHENOL, 3-ETHYL-	3.05
685	BENZENE, 1-METHYL-3-PROPYL-	0.03
709	CYCLOHEXANE, ETHYL-	0.10
724	PHENOL, 4-(1-METHYLETHYL)-	0.81
749	PHENOL, 4-(1-METHYLETHYL)-	**
763	BENZENE, 1-METHOXY-3-METHYL-	3.40
801	BENZENE, 1,3,5-TRIMETHYL-	3.96
813	PHENOL, 3,4-DIMETHYL-	4.98
823	PHENOL, 2,4-DIMETHYL-	2.61
844	BENZENE, 1,2,4-TRIMETHYL	**
873	BENZENE, 1,3,5-TRIMETHYL*	7.23
909	PHENOL, 4-OCTYL-	0.25
929	DECANE	3.85
939	PHENOL, 2,3,5-TRIMETHYL-	2.63
976	PHENOL, 2-ETHYL-4-METHYL-	**
986	BENZENE, 4-ETHYL-1,2-DIMETHYL	3.05

Sample No. 9
Ref: EPA Files

LEE 001

000249

Scan No.	Compound	Percent by Wt.
1002	BENZENE, 2-ETHYL- 1,4-DIMETHYL	0.67
1069	UNDECANE*	*
1092	UNKNOWN	2.33
1131	DECANE, 2-METHYL-	1.28
1200	UNKNOWN	0.51
1236	UNDECANE	3.59
1295	DODECANE*	0.33
1359	UNKNOWN	1.15

Lib.	Compound	Percent by Wt
1519	PENTANE, 3,3-DIMETHYL-	0.97
1573	UNKNOWN (HYDROCARBON)	0.25
1663	UNKNOWN	0.15
1711	PHENOL, 2,6-BIS(1,1-DIMETHYLETHYL)-4-METHYL*	0.25
1821	PHENOL, 2,6-BIS(1,1-DIMETHYLETHYL)-4-METHYL	0.25
1909	UNKNOWN	1.40

LEE 001

000251

RESULTS

THE FOLLOWING COMPOUNDS WERE IDENTIFIED IN THE SAMPLE.

SCAN NO.	COMPOUND	PERCENT BY WT.
[illegible]	BENZENE	0.05
136	BICYCLO OCTANE	0.11
160	CYCLOHEXANE, METHYL-	0.03
211	PENTALENE, OCTAHYDRO-, CIS	0.19
387	BENZENE, METHYL-	7.33
435	PHENOL	27.4

LEE 001

0,00252

Scan No.	Compound	Percent by Vol
560	BENZENE, 1,3-DIMETHYL-	30.72
679	BENZENE, (1-METHYLETHYL)-	1.05
781	BENZENE, 1,4-DIMETHYL-	14.03
845	BENZENE, 1,3-DIMETHYL-	6.76
891	PHENOL, 2-METHYL-	2.77
932	PHENOL, 3-METHYL-	2.13

LEE 001

000253

Scan No.	Compound	Percent by Wt.
1046	BENZENE, 1-ETHYL-3-METHYL-	0.74
1099	NONANE	0.25
1253	PHENOL, 2,5-DIMETHYL-	0.21
1465	UNDECANE	0.23

LEE 001

000254

THE FOLLOWING COMPOUNDS WERE IDENTIFIED IN THE SAMPLE

QUANTITATION REPORT FILE: ELEVEN

DATA: ELEVEN.TI
04/09/80 6:25:00
SAMPLE: DRUM SAMPLE NO. 11...LEE'S LANE LANDFILL
CONDS.: SP-1000, 120 FOR 1 MIN, 220 AT 1.5 DEG/MIN
FORMULA: INSTRUMENT: FINN WEIGHT: 0.000
SUBMITTED BY: DHM ANALYST: MILES ACCT. NO.:

AMOUNT=AREA * REF. AMNT/(REF. AREA* RESP. FACT)

NO	NAME
1	BENZENE
2	CYCLOHEXANE, METHYL-
3	2-PENTANONE, 4-METHYL-
4	ETHENE, TETRACHLORO-
5	TRICYCLO\3.3.1.13,7\DECANE
6	BENZENE, METHYL-
7	PHENOL
8	UNKNOWN
9	BENZENE, (1-METHYLETHYL)-
10	PHENOL, 2-METHYL-
11	BENZENE, ETHYL-
12	PHENOL, 2-METHYL-
13	PHENOL, 2-METHYL-
14	BENZENE, PROPYL-
15	1,1'-BICYCLOPENTYL
16	2,3-HEPTADIEN-5-YNE, 2,4-DIMETHYL-
17	BENZENE, 1,2,3-TRIMETHYL-
18	PHENOL, 4-ETHYL-
19	BENZENE, 2-ETHYL-1,4-DIMETHYL-
20	PHENOL, 2-ETHYL-
21	PHENOL, 4-ETHYL-
22	CYCLOHEXANE, BUTYL-
23	BENZENE, 1-METHOXY-3-METHYL-
24	BENZENE, 1,2,3-TRIMETHYL-
25	PHENOL, 2,4-DIMETHYL-
26	PHENOL, 3,4-DIMETHYL-
27	BENZENE, 1,3,5-TRIMETHYL-
28	BENZENE, 1,2,4-TRIMETHYL-
29	DECANE
30	BENZENE, 2-ETHYL-1,4-DIMETHYL-
31	PHENOL, 2-ETHYL-5-METHYL-
32	UNKNOWN
33	BENZENE, 2-ETHYL-1,4-DIMETHYL-
34	UNDECANE *
35	NONANE, 5-BUTYL-
36	DECANE, 2-METHYL-
37	UNDECANE

NO	M/E	SCAN	TIME	REF	RRT	METH	AREA	AMOUNT	%TOT
1	TOT	58	2:54	27	0.055	A BB	13540.	0.062	0.01
2	TOT	91	4:33	27	0.086	A VB	44888.	0.205	0.02
3	TOT	104	5:12	27	0.098	A BB	2714750.	12.417	1.45
4	TOT	164	8:12	27	0.155	A BB	37078.	0.170	0.02
5	TOT	194	9:42	27	0.184	A BB	72066.	0.330	0.04
6	TOT	221	11:03	27	0.209	A BB	52608.	0.241	0.03
7	TOT	246	12:18	27	0.233	A BB	16553700.	75.718	8.82
8	TOT	343	17:09	27	0.325	A BB	40798.	0.187	0.02

NO	M/E	SCAN	TIME	REF	RRT	METH	AREA	AMOUNT	%TOT
9	TOT	444	22:12	27	0.420	A BB	1298490.	5.939	0.69
10	TOT	547	27:21	27	0.518	A BB	3688600.	16.872	1.96
11	TOT	568	28:24	27	0.538	A BB	202112.	0.924	0.11
12	TOT	592	29:36	27	0.561	A BB	14664300.	67.076	7.81
13	TOT	619	30:57	27	0.586	A BB	13084100.	59.848	6.97
14	TOT	621	31:03	27	0.588	A BB	8623230.	39.443	4.59
15	TOT	697	34:51	27	0.660	A BB	1082260.	4.950	0.58
16	TOT	747	37:21	27	0.707	A BB	11720000.	53.608	6.24
17	TOT	776	38:48	27	0.735	A BB	10095200.	46.176	5.38
18	TOT	788	39:24	27	0.746	A VB	3555580.	16.263	1.89
19	TOT	812	40:36	27	0.769	A BB	1623580.	7.426	0.86
20	TOT	813	40:39	27	0.770	A BB	3920630.	17.933	2.09
21	TOT	813	40:39	27	0.770	A BB	3860730.	17.659	2.06
22	TOT	847	42:21	27	0.802	A BB	934064.	4.272	0.50
23	TOT	933	46:39	27	0.884	A BB	2552760.	11.677	1.36
24	TOT	988	49:24	27	0.936	A BV	5121790.	23.427	2.73
25	TOT	1005	50:15	27	0.952	A BB	5754870.	26.323	3.07
26	TOT	1025	51:15	27	0.971	A BB	5213170.	23.845	2.78
27	TOT	1056	52:48	27	1.000	A BB	21862300.	100.000	11.64
28	TOT	1088	54:24	27	1.030	A BB	9592060.	43.875	5.11
29	TOT	1145	57:15	27	1.084	A BB	4392440.	20.091	2.34
30	TOT	1157	57:51	27	1.096	A BB	1737080.	7.946	0.93
31	TOT	1191	59:33	27	1.128	A BB	4945790.	22.622	2.63
32	TOT	1226	61:18	27	1.161	A BB	3738610.	17.101	1.99
33	TOT	1247	62:21	27	1.181	A BB	507327.	2.321	0.27
34	TOT	1325	66:15	27	1.255	A BB	3951350.	18.074	2.10
35	TOT	1352	67:36	27	1.280	A BB	2043640.	9.348	1.09
36	TOT	1396	69:48	27	1.322	A BB	3108600.	14.219	1.66
37	TOT	1513	75:39	27	1.433	A BB	15355900.	70.239	8.18

Sample No. 11
Ref: . EPA Files
A-9

LEE 001

000255

THE FOLLOWING COMPOUNDS WERE IDENTIFIED IN THE SMPLE

QUANTITATION REPORT FILE: SEVENTEEN

DATA: SEVENTEEN.TI
04/09/80 9:17:00
SAMPLE: DRUM SAMPLE NO. 17...LEE'S LANE LANDFILL
CONDS.: SP-1000,100 DEG FOR 1 MIN,220 DEG @ 3 DEG/MIN
FORMULA: INSTRUMENT: FINN WEIGHT: 0.000
SUBMITTED BY: DHM ANALYST: MILES ACCT. NO.:

AMOUNT=AREA * REF. AMNT/(REF. AREA* RESP. FACT)

NO	NAME
1	PHENOL
2	BENZENE, ETHYL-
3	PHENOL, 2-METHYL-
4	BENZENE, 1,2-DIMETHYL-
5	PHENOL, 2-METHYL-
6	PHENOL, 2-METHYL-
7	PHENOL, 2-ETHYL-
8	BENZENE, 1-ETHYL-4-METHYL-
9	PHENOL, 3-ETHYL-
10	PHENOL, 4-ETHYL-
11	PHENOL, 4-(1-METHYLETHYL)-
12	PHENOL, 2, 5-DIMETHYL-
13	PHENOL, 2, 4-DIMETHYL-
14	PHENOL, 2, 5-DIMETHYL-
15	BENZENE, 1, 2, 4-TRIMETHYL-
16	PHENOL, 3, 4-DIMETHYL-
17	PHENOL, 2-ETHYL-5-METHYL-
18	PHENOL, 2, 3, 5-TRIMETHYL-
19	PHENOL, 2, 4, 6-TRIMETHYL-

NO	M/E	SCAN	TIME	REF	RRT	METH	AREA	AMOUNT	%TOT
1	TOT	311	15:33	13	0.402	A BB	13734300.	77.550	11.64
2	TOT	395	19:45	13	0.511	A BB	195594.	1.104	0.17
3	TOT	517	25:51	13	0.669	A BB	9484550.	53.554	8.04
4	TOT	530	26:30	13	0.686	A VB	416128.	2.350	0.35
5	TOT	543	27:09	13	0.702	A BB	14097900.	79.603	11.95
6	TOT	559	27:57	13	0.723	A BB	6315640.	35.661	5.35
7	TOT	626	31:18	13	0.810	A BB	1351900.	7.633	1.15
8	TOT	636	31:48	13	0.823	A VB	311624.	1.760	0.26
9	TOT	655	32:45	13	0.847	A BV	4345340.	24.536	3.68
10	TOT	669	33:27	13	0.865	A VB	2735610.	15.446	2.32
11	TOT	708	35:24	13	0.916	A BB	64376.	0.363	0.05
12	TOT	735	36:45	13	0.951	A BB	16545500.	93.423	14.02
13	TOT	779	38:39	13	1.000	A BV	17710300.	100.000	15.01
14	TOT	782	39:06	13	1.012	A VB	14243300.	80.424	12.07
15	TOT	804	40:12	13	1.040	A BV	581376.	3.283	0.49
16	TOT	815	40:45	13	1.054	A BB	4377340.	24.716	3.71
17	TOT	877	43:51	13	1.135	A BB	2476790.	13.985	2.10
18	TOT	1050	52:30	13	1.358	A BB	1759610.	9.936	1.49
19	TOT	1112	55:36	13	1.439	A BB	7270390.	41.052	6.16

APPENDIX B

SUMMARY OF PREVIOUS ACTIONS CONCERNING
LEES LANE LANDFILL

March 13, 1975	Jefferson County Department of Health was notified of the presence of an unusual gas in an area of Riverside Gardens. Flash fires were reported around water heaters. Methane gas was detected at explosive levels.
March 19, 1975	Seven families were evacuated along Putman Street. Temporary housing was provided by the County Housing Authority. Costs for relocation and purchase of homes was in excess of $150,000.
March 20-21, 1975	Louisville and Jefferson County Department of Health had four test wells drilled in the area of Putman Street.
April 3, 1975	Temporary restraining order issued by the Franklin Circuit Court to restrain the operation of Lees Lane Landfill.
April 8, 1975	Surveillance and Analysis Division, EPA, Region IV, reported gas sample analyses from monitor and private wells near Lees Lane Landfill. Methane gas and toxic compounds were found.
April 9, 1975	Findings of Fact and Conclusions of Law filed in Franklin Circuit Court that landfill was operating without a permit.
July 9, 1975	Report published by John E. Heer, Jr. and D. Joseph Hagerty, consultants for Ben Hardy, entitled Preliminary Report, Lees Lane Landfill which recommended a gas venting system. Ben Hardy was attorney for Lees Lane Landfill owners.
July 16, 1975	Report published by Surveillance and Analysis Division, EPA, Region IV, entitled Monitoring Near the Lees Lane Landfill in Louisville, Kentucky. Organic and industrial type gases were found in monitor wells. Vinyl chloride was not found in the ground water.

September 2, 1975	Report by Lees Lane Advisory Committee published. It concluded that "the concept of collecting the gases that has been proposed by the Hofgesang Company consultants appears to offer a logical approach".
September 2, 1975	Report by Louisville and Jefferson County Department of Health entitled, Putman Road Gas Problem, was published. It concluded that a gas pressure gradient existed between the landfill and the monitor wells.
October 30, 1975	Corps of Engineers informed Kentucky Department of Natural Resources and Environmental Protection that the landfill operators had excavated to the center line of the proposed levee in the southern most section of the landfill and the excavations had been filled in with "garbage, tree limbs and other unsuitable fill".
October, 1977	Planning Commission completed a Small Area Study of Riverside Gardens which recommended that Fiscal Court fund an engineering study of the gas problem.
January, 1978	Task Force was formed to initiate an engineering study of the methane gas problem.
March, 1978	Fiscal Court authorized $60,000 from Community Development funds to conduct the study.
May 12, 1978	Housing Authority entered into contract with Stearns, Conrad, and Schmidt, Consulting Engineers (SCS) to perform the study.
June 1, 1978	SCS Engineers began 16 month long project entitled Engineering Study of Hazardous Gas Migration at Lees Lane Landfill.
June 5-12, 1978	SCS Engineers installed monitor wells near Lees Lane Landfill.
August 22, 1978	SCS Engineers submitted to Jefferson County estimated costs and profits which might be realized from a gas recovery system on the landfill property.

September 27, 1978	Jefferson County Housing Authority Board of Commissioners corresponded their opinion to Judge Mitch McConnell that they felt there was "a great potential of eminent danger of an explosion from the existing methane gas."
November 13, 1978	New Task Force in Jefferson County met to discuss EPA funding sources for gas venting system.
December 12, 1978	SCS Engineers submitted the Environmental Review document for Lees Lane Landfill gas venting system.
December 14-16, 1978	EPA National Enforcement Investigations Center (NEIC), Denver, submitted its Phase I investigation of Lees Lane Landfill vicinity for methane gas. "High concentrations of methane/combustible gas were present in a number of test wells sampled during this investigation."
December 16, 1978	SCS Engineers reported gas sample analyses from test wells near Lees Lane Landfill.
January 8-12, 1979	NEIC, Denver, submitted its Phase II investigation of Lees Lane Landfill vicinity for methane gas. "The levels of methane and other combustible gases in these homes (Riverside Gardens) were well below the explosive level of methane."
January 9, 1979	EPA, Region IV, urged HUD to release funds to finance the installation of the methane gas venting system.
January 11, 1979	Attorney James F. Bycott, EPA, Legal Branch informed the Public Works Department of Louisville and Jefferson County that "Since EPA, Region IV, feels the methane-gas buildup does present an immediate hazard, the city and county should procede to install the gas-venting system to alleviate the problem. Region IV will assist . . . in any way possible to facilitate the HUD-community development funds."

January 12, 1979	Marvin B. Duning, EPA Assistant Administrator for Enforcement informed Region IV Administrator that he did not concur with the initiation of an imminent hazard prosecution in the case of Lees Lane Landfill.
January 24, 1979	Attorney James F. Bycott, EPA, Legal Branch, recommended further investigations around Lees Lane Landfill.
March 16, 1979	EPA, Region IV, Chief of Residuals Management Branch reported that since methane gas adjacent to houses in Riverside Gardens was only 0.1 to 0.5% by volume, EPA Headquarters did not recognize an imminent hazard under Section 7003 of the Resource Conservation and Recovery Act.
April 25, 1979	Attorney James F. Bycott, EPA, Legal Branch, reported that "EPA Headquarters insists that, at the bare minimum, 1% methane by volume above ground is necessary for the filing of a Section 7003 Resource Conservation and Recovery Act lawsuit. Attempts to refer a case predicated on water pollution occurring under the ground also appear stymied."
July 30, 1979	SCS Engineers submitted to Jefferson County the design report for the Lees Lane Landfill Methane Gas Control System.
February 27, 1980	Kentucky Department of Hazardous Materials and Waste Management (HMWM) visited site and found approximately 200 drums. Apparently drums were deposited years ago; earth cover had eroded.
February 29, 1980	Kentucky Department of HMWM Emergency Coordinator and Jefferson County Health Department visited site and found drums in bad condition, several rusted through, 100 feet from river bank and approximately 10 feet vertical rise from river. Two samples were taken. Samples were a phenolic resin.

March 4, 1980	Jefferson County Health Department sampled 4 drums and determined flash points to be 85°F and found relatively high concentrations of metals: Cu, Cd, Ni, Pb, and Cr.
March 14, 1980	Kentucky Division of HMWM sent Ben Hardy a letter describing hazardous situation and requested removal and proper disposal of drums.
March 20, 1980	EPA Disposal Site Unit informed EPA Environmental Emergency Branch of possible 311 Action under the Clean Water Act at Lees Lane Landfill if river rises above drums.
March 24, 1980	Ben Hardy replies by letter that he does not feel that drums are a hazard and that J&H Realty is the property owner, not Hofgesang Sand Company.
March 27, 1980	Additional samples were taken of drums and analyses indicated flashpoints ranging from 77°F to >150°F. One sample tested negative for PCB.
March 31, 1980	Abate and Alleviate Order prepared by State.
April 2, 1980	Kentucky Divison of HMWM received results of flashpoint testing of random samples along the Ohio River bank on Lees Lane Landfill property. Results indicated flashpoints ranging from 75°F to >150°F.
April 2, 1980	Secretary of Kentucky Department of Natural Resources and Environmental Protection (DNREP) issued an Order to Abate and Alleviate conditions surrounding the disposal of barrels of hazardous wastes on property owned by the Defendants.
April 8-9, 1980	Divison of HMWM analyzed barrel samples. The two most hazardous materials were compounds of benzene and phenol.
April 11, 1980	A hearing was held at which time the DNREP presented evidence substantiating the conditions at the Lees Lane Landfill.

May 21, 1980	Division of HMWM reported that Ben Hardy had filed an exceptance to the State's Abate and Alleviate Order indicating that he plans to take no action to remove the 400 exposed drums.
May 21, 1980	Divison of HMWM reported that Jefferson County was not able to start the construction of the gas collection system due to insufficient funds. Jefferson County asked SCS Engineers to redesign the system to use existing wells off site as a venting system.
June 12, 1980	Secretary of DNREP issued an Order stating that the Order to Abate and Alleviate shall remain in full force and effect.
July 14, 1980	The EPA Uncontrolled Site Section of the Disposal Site Unit completed a tentative disposition concluding that Lees Lane Landfill should be considered for enforcement action. The Site Referral Package prepared by the Uncontrolled Site Section, was forwarded to the Enforcement Division. Health threats noted were as follows: "The drums of hazardous materials are situated in the flood plain of the Ohio River which is a public drinking water supply."
August 5, 1980	The Kentucky DNREP filed a complaint against J. H. Realty, Inc. and The Hofgesang Foundation, Inc., owners of Lees Lane Landfill, stating in part, "That the Defendants have failed to abate and alleviate the conditions surrounding the disposal of barrels of hazardous waste on its property as ordered by the Secretary and to the best of Plaintiff's knowledge has failed to act in any fashion to remedy those conditions" (Filed in Franklin Circuit Court).
October, 1980	Jefferson County installed 11 new gas-venting wells and a collection/venting system.

January, 1981	Kentucky DNREP filed applications with the Corps of Engineers and Jefferson County to install 5 to 8 ground-water monitoring wells near Lees Lane Landfill. Funding is, in part, from the Water Resources Council of the Department of Interior. Mr. Hardy was going to allow access to the river side of the landfill.
January 15, 1981	Mr. Ed Robinson, Jefferson County Works Department, reported that the new gas venting system was working satisfactorily.
January 19, 1981	Kentucky DNREP was granted a Summary Judgement against Ben Hardy which allowed him 90 days to clean-up drums along the river bank.
March, 1981	Ground-water monitoring wells completed.
April, 1981	Wells were sampled by joint effort of EPA, KY-DNREP, and Ecology and Environment, Inc. "These wells were not constructed and developed properly in order to obtain true representative ground-water samples. Consequently, the analytical results are elevated because of the large quantity of sediment in the samples" (EPA, SAD, Athens, GA., 1981).
September-October, 1981	Ben Hardy had exposed drums along river bank pumped of liquid waste. The solid wastes and empty drums were buried on site as per a plan approved by KY-DNREP.

APPENDIX C

COMMUNITY RELATIONS CONSIDERATIONS

This site is in an industrialized area near downtown Louisville, Kentucky, on the banks of the Ohio River. This site is still in the early stages of a remedial response and until remedial activities are further developed, a community relations plan can only be conceptualized in the most basic elements.

During the early stage of response, close communication with state officials will be required to obtain a complete history of the site and a list of key individuals and organizations who are interested in the project. A similar effort will be made with city and county officials.

When a complete list of interested residents, organizations, and businesses has been developed, a visit to the area would be appropriate. The purpose of this visit is to become more familiar with the site and to get first-hand, in an informal and personal setting, the affected citizens' concerns about the site. The process of building lists of interested residents and public officials will also be a part of the interview process.

Depending on the level and intensity of community interest, the following activities will be used as the field investigation phase proceeds:

- o Community information interviews
- o Briefings/press conferences
- o Community Relations Plan Development
- o Public consultations
- o Fact sheets
- o Workshops
- o Formal public meeting and/or hearing
- o Formation of citizen's advisory committee
- o Newsletters
- o News/Releases
- o Responsiveness Summary

It is not expected that all of the above mentioned techniques will be used but that determination cannot be made until the level of community interest has been determined.

Because the adjacent subdivision of Riverside Gardens has been previously affected by methane gas migration from the landfill, some special efforts should be made to insure that those residents are thoroughly informed.

A draft of the guidance, "Community Relations Development Plan," is attached for reference. This guidance package generally outlines community relation needs that could be addressed in a formal community relations plan. However, the plan must be tailored to the level of community and public interest at Lees Lane Landfill. The plan must also be flexible enough to allow changing levels of community involvement. (Hitchcock, 1981)

COMMUNITY RELATIONS DEVELOPMENT PLAN

1. Introduction

According to the Interim Community Relations Guidance of February 25, and July 28 1981, and Annex XI of the Draft National Contingency Plan, Community Relations Plans (CRPs) are to be prepared for Superfund removal and remedial actions. Plans are required for:

A. All removal actions lasting longer than two weeks;

B. Field investigation, engineering feasibility studies, and remedy selection (Stage I CRP);

C. Design and construction of remedial actions (Stage II CRP).

2. Headquarters Organization

Coordinators have been selected within OERR, each responsible for national oversight of community relations during a specific response phase. These individuals will provide guidance on programmatic issues relating to community relations and support to the regions as needed for developing and implementing CRP's. Overall management direction of the coordinators will come from their respective division directors. The names and telephone numbers of the coordinators are:

Response Phase	Coordinator	Division	Phone
Removal Actions	Mike Flaherty	ERD	FTS-245-3057
Remedial Response	Tony Diecidue	HSCD	FTS-382-2454

The Environmental Response Team will also be available to assist in plan development. The Headquarters contact is Conrad Kleveno, HRSD, FTS 245-3048.

3. Plan Development

OERR is providing direct contractor assistance to help the regions develop CRP's. Requests for assistance should be directed to Tony Diecidue, Hazardous Site Control Division. Mr. Diecidue will serve as liaison between the contractor in Washington, D.C. and the Regional Superfund Coordinator or his designee.

All requests for assistance should be in writing and signed by the Regional Superfund Coordinator. Requests may be expedited, however, by telephone and/or magnafax with a follow-up written request. All requests should contain the following elements.

A. Name of site - The contractor will only be tasked to provide assistance on sites selected for funding.

B. Name of Regional contact - This should be the individual who will direct the contractor, and who will approve all activites performed by the contractor prior to initiation.

C. Statement of Work - This should be a brief summary of services to be performed by the contractor. Factors such as the levels of Regional office staff involvement and knowledge already

obtained about the nature of community involvement at the site should be considered when developing the Statement of Work.

D. Estimated hours/costs to be accrued - This should include the number of contractor hours and any travel between the Regional office and the site.

Upon Headquarters receipt and review of requests for assistance, the contractor will be assigned the project, travel to the Region and assist in developing a plan for approvaal of the Regional Superfund Coordinator (along with State representative, when applicable).

4. Plan Submission

Following Regional/State approval, removal action CRP's should be submitted to Henry Van Cleave, Acting Director, Emergency Response Division, OERR. If practicable, plans should be submitted before removal actions begin. If not, they should be submitted at the earliest possible date.

CRP's for remedial actions should be submitted to Russel Wyer, Acting Director, Hazardous Site Control Division, OERR.

5. Format for Community Relations Plans

CRP's will consist of the following sections. The information to be provided in each section is described under the section heading. Removal actions and both Stage I and Stage II CRP's will use the same format, with suitable modifications in the kind of information presented.

A. Background and History of Community Involvement of the Site

1. Characterize community concern.

a. Who is active?

b. What issues are being raised? By whom?

c. What kinds of activity have taken place?
— meetings, demonstrations, petitions, etc.

d. What is the overall degree of community concern?

2. List the key issues being raised or likely to be raised by the community.

B. Specific Objectives of the Community Relations Program

A community relations program has two major goals:

- Provide accurate, timely information about the response to the community.

- Allow citizens to express their concerns to agency decision makers.

1. List specific objectives of the CRP.

   a. What specific points is the Agency attempting to communicate to the community?

   b. What specific decisions does the Agency desire input on (e.g., alternative remedy selection, schedules of construction)?

C. Community Relations Techniques to be Used to Meet Specific Objectives

1. List techniques to be utilized for each response activity and the objectives each technique is intended to serve. (See Exhibit 1.)

D. Workplan and Schedule

1. Graphic display of schedule of community relations events described under "C" above. (See Exhibit 2.)

   a. Should include milestones for each event and preparatory activities needed for each event.

   b. Should include provisions for review and revision of the CRP every 3 months.

E. Budget and Staffing Plan

1. Specify Agency staff responsible for each activity, and work hours required.

2. Specify contractor materials and labor needed. (See Exhibit 3.)

EXHIBIT I

COMMUNITY RELATIONS TECHNIQUES AND OBJECTIVES

Activity: Full Field Investigation

Technique	Objective
1. Briefing local officials	— Inform leaders of schedule, tasks, and rationale behind investigation.
2. Press release	— Inform community general public of schedule and tasks.
3. Informal meetings with affected public (neighbors of site)	— Inform affected public on scheduling of investigation work, the need for protective gear, investigators, etc.
4. Second briefing with local officials and interest group leaders	— Inform leaders of results of field investigations.

EXHIBIT II

SCHEDULE

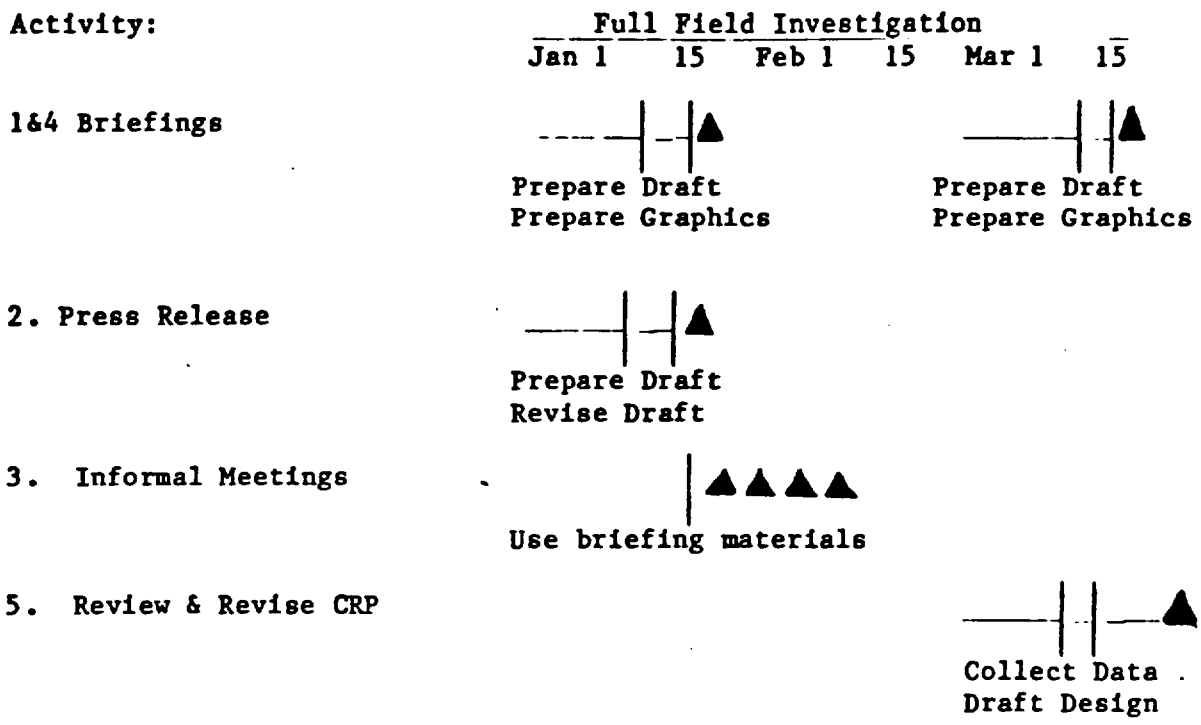

EXHIBIT III

BUDGET AND STAFFING PLAN#

Activity: Full Field Investigation

Week	Activity	Staff Responsibility	Workhours	Contract $
1/15	Briefing	Primary: OSC*	6	
		Prep: Contractor* and EPA Staff*	10	$350
1/15	Press Release	Primary: OSC	2	
		Prep: EPA Staff	6	$350
1/22	Informal Meeting	Primary: OSC	4	
		Prep: EPA Staff and Contractor	2	$150
1/29	Informal Meeting	Primary: EPA Staff	3	
		Prep: EPA Staff	1	
2/5	Informal Meeting	Primary: EPA Staff	3	
		Prep: EPA Staff	1	
2/12	Informal Meeting	Primary: OSC	4	
		Prep: EPA Staff and Contractor	2	$150
3/15	Briefing	Primary: OSC	6	
		Prep: Contractor and EPA Staff	10	$350
	Total 6 Site Visits	(2 hours driving each way)	24	$300
	TOTAL:		84	$1,650

#Each technique will require, on average, both agency staff days for oversight and those tasks only an official can perform, as well as the contractor support resources listed here. IMPORTANT NOTE: The staff and contract dollar requirements are rough estimates only. Costs will differ substantially from Region to Region.

*Each individual should be meantioned by name in an actual CRP. "EPA Staff" may be one or more individuals designated by the OSC to perform the activities listed above.

APPENDIX D
MITRE RANKING FORMS

Site Name: Lees Lane Landfill

Location: Louisville, Kentucky

EPA Region: IV

Person(s) in Charge of the Site:

Name of Reviewer: H. Dan Harman, Jr (September 1981)

Site Overall Score: 47.46

General Description of the Site:

(For example: landfill, surface impoundment, pile, container; types of wastes; location of the site; contamination route of major concern; types of information needed for rating; agency action, etc.)

Lees Lane Landfill is a 125-acre tract of land in the floodplain of the Ohio River, Jefferson County, Kentucky, within which is buried domestic, industrial, and commercial wastes from a 23-year history of operation. Approximately 300 empty and 100 full drums of identified toxic organic compounds and high concentrations of metals are exposed along the river bank within the river flood stage. Ground water is a contamination route of major concern as well as is surface water if the river floods.

In October 1981, the exposed drums along the river bank were removed.

ROUTE - GROUND WATER

Rating Factor	Basis of Information	Site Rating (Circle One)	Multiplier	Site Score	Maximum Possible Score
1 OBSERVED RELEASE (set GW 1)					
Measured Level or Evidence of Release	EPA	0 (45)	1	45	45
If the site score is zero, go to step 2 otherwise, go to step 5					
2 ROUTE CHARACTERISTICS[1] (set GW 2)					
Depth to Aquifer of Concern		0 1 2 3	2		6
Net Precipitation		0 1 2 3	1		3
Permeability of Unsaturated Zone		0 1 2 3	2		6
			Subtotal		15
3 CONTAINMENT[1,2] (set GW 3)					
Containment		0 1 2 3	1		3
4 POTENTIAL FOR RELEASE					
Multiply site score from 2 by site score from 3. The product is site rating for this route.			1		45
5 RELEASE					
Enter site score from 1 or 4				45	45
6 WASTE CHARACTERISTICS[1,3] (set GW 4)					
Physical State	Liquid & Gas	0 1 2 (3)	1	3	3
Persistence	Chromium	0 1 2 (3)	2	6	6
Toxicity/ Infectiousness	Chromium	0 1 2 (3)	2	6	6
			Subtotal	15	15
7 HAZARDOUS WASTE QUANTITY[1] (set GW 5)					
Total Waste Quantity (by Superfund definition) excluding waste that is totally contained	Eckhardt Rep.	0 1 2 3 4 (5)	1	5	8
8 TARGETS[1] (set GW 6)					
Ground Water Use	Recreation	0 1 (2) 3	3	6	9
Distance to Nearest Well Downgradient	2,000'	0 1 2 (3)	3	9	9
Population Served by Ground Water Within 3 Mile Radius	53	0 (1) 2 3 4 5	6	6	30
			Subtotal	21	48
9 GROUND WATER ROUTE SUBTOTAL					
A. Multiply 5 x 6 x 7 x 8				70,875	162,000
B. Multiply [A.] by Normalization Factor of 0.6 and Divide by 1,000			0.6	42.53 [B.] Route Subtotal	97.2

[1] A rating of zero should be entered when data is unavailable to rate an additive factor. A rating of 1 should be entered when data is unavailable to rate a multiplicative category such as the waste quantity or containment. A total of 5% missing data for the entire site is allowed when rating a site.

[2] If the site has more than one type of containment (e.g., surface impoundment, landfill, containers), consider all cases separately and enter the score from the worst case.

[3] Rate the two most hazardous wastes. Select the one with the highest subtotal score and enter that score.

LEE 001 SURFACE WATER

000273

Rating Factor	Basis of Information	Site Rating (Circle One)	Multiplier	Site Score	Maximum Possible Score
1 OBSERVED RELEASE (ref SW 1)					
Measured level or evidence of release		0 (45)	1		45
If the site score is zero, go to step 2 otherwise, go to step 5					
2 ROUTE CHARACTERISTICS[1] (ref SW 2)					
Site Slope and Terrain	12-20%	0 1 2 (3)	1	3	3
1 Year 24 Hour Rainfall	2.75	0 1 (2) 3	1	2	3
Distance to Surface Water	100'	0 1 2 (3)	1	3	3
Flood Potential	In floodway	0 1 2 (3)	2	6	6
			Subtotal	14	15
3 CONTAINMENT[1,2] (ref SW 3)					
Containment	None	0 1 2 (3)	1	3	3
4 POTENTIAL FOR RELEASE					
Multiply site score from 2 by site score from 3. The product is site rating for this route.			1	42	45
5 RELEASE					
Enter site score from 1 or 4				42	45
6 WASTE CHARACTERISTICS[1,2] (ref SW 4)					
Physical State	Liq. & Gas	0 1 2 (3)	1	3	3
Toxicity/ Infectiousness	Chromium	0 1 2 (3)	2	6	6
Persistence	Chronium	0 1 2 (3)	2	6	6
			Subtotal	15	15
7 HAZARDOUS WASTE QUANTITY[1] (ref SW 5)					
Total Waste Quantity (By Superfund definitions excluding waste that is totally contained)	Eckhart Rep.	0 1 2 3 4 (5)	1	5	8
8 TARGETS[1] (ref SW 6)					
Surface Water Use	Recreation	0 1 (2) 3	3	6	9
Critical Habitats	In floodway	0 1 2 (3)	2	6	6
Population Served By Surface Water With Water Intake Within 3 Miles Downstream From Site	None	(0) 1 2 3 4 5	6	0	30
			Subtotal	12	45
9 SURFACE WATER ROUTE SUBTOTAL					
A. Multiply 5 x 6 x 7 x 8			37,800		151,875
B. Multiply [A] by normalization factor of 0.64 and divide by 1,000			0.64	24.19 (To) Route Subtotal	97.2

LEE 001

ROUTE - AIR

000274

Rating Factor	Basis of Information	Site Rating (Circle One)	Multiplier	Site Score	Maximum Possible Score
1	OBSERVED RELEASE* (ref A 1)				
Evidence of Release	EPA	0 (45)	1	45	45
If the site score is zero, the route subtotal score is zero, otherwise, go to Step 2					
2	RELEASE				
Enter site score from 1				45	45
3	WASTE CHARACTERISTICS[1,3] (ref A 2)				
Physical State / Volatility	Gas	0 1 2 (3)	1	3	3
Reactivity	dichloroethylene	0 1 (2) 3	1	2	3
Incompatibility	present but pres.	0 1 (2) 3	1	2	3
Toxicity/ Infectiousness	no hazard Methane/vinyl	0 1 2 (3)	2	6	8
	chloride		Subtotal	13	15
4	HAZARDOUS WASTE QUANTITY[1] (ref A 3)				
Total Waste Quantity	Eckhart Report	0 1 2 3 4 (5)	1	5	8
By Superfund definition excluding waste that is totally contained					
5	TARGETS[1] (ref A 4)				
Distance to Nearest Population	300'	0 1 (2)	2	6	6
Population Within 1 Mile Radius	1,470	0 1 2 (3) 4 5	5	15	25
Critical Environments	Floodway	0 1 2 (3)	2	6	6
Land Use	LG&E Power	0 1 2 (3)	1	3	3
	Plant 1/10 mile		Subtotal	30	40
6	AIR ROUTE SUBTOTAL				
A. Multiply 2 x 3 x 4 x 5				87,750	135,000
B. Multiply [A] by normalization factor of 0.72 and divide by 1,000			0.72	63.18 [B.] Route Subtotal	97.2

*Only air monitoring data will be considered as evidence of release.

10

LEE 001

000275

AGGREGATE SITE RATING			
Route	Route Subtotal from 6 or 9	Route Subtotal Squared	Maximum Possible Score
Ground Water	42.53	1808.80	$(97.2)^2 = 9447.84$
Surface Water	24.19	585.16	$(97.2)^2 = 9447.84$
Air	63.18	3991.71	$(97.2)^2 = 9447.84$
Sum		6385.67	28,343.52
Square Root of Sum		79.91	168.36
Overall Score* = $\frac{\text{sum} \times 100}{168.36}$		47.46	100

FIRE AND EXPLOSION	
Route Subtotal from 8	Maximum Possible Score
	97.2
Adjusted Score = $\frac{\text{Route Subtotal} \times 100}{97.2}$	

DIRECT CONTACT	
Route Subtotal from 8	Maximum Possible Score
	97.2
Adjusted Score = $\frac{\text{Route Subtotal} \times 100}{97.2}$	

*The overall and adjusted scores will be between 0 and 100. The maximum overall score for a site with only one exposure route is 57.7.

APPENDIX E
SELECTED WELLS
IN VICINITY OF LEES LANE LANDFILL

WELL NO.	OWNER OR REPORTING AGENCY	ALTITUDE OF LSD[1] (FEET)	WELL DEPTH (FEET)	DIAMETER (INCHES)	DEPTH TO WATER LEVEL (FEET)	USE
PU-519	Mr. Lowell Wright 6519 Putnam St.					D[2]
LE-416	Mr. Martin Faircloth 4416 Lees Lane					do[3]
LU-604	Mr. James Mann 6604 Lucerne St.					do
WL-416	Mr. T. O. Frankie 4416 Wilshire Blvd.					do
WM-422	Mr. Joseph Downs 4422 Wilmoth Ave.					do
LE-405	Mr. Morris Parker 4405 Lees Lane					do
PU-503	Mr. William Hayburn 6503 Putnam St.					do
LU-614	Mr. James Salleng 6614 Lucerne St.					do
HO-508	Mr. Cecil Simpson 6508 Howard Ave.					do
WM-408	Mr. Ashley (tenant) 4408 Wilmoth Ave.					do

APPENDIX E
SELECTED WELLS
IN VICINITY OF LEES LANE LANDFILL (cont)

WELL NO.	OWNER OR REPORTING AGENCY	ALTITUDE OF LSD[1] (FEET)	WELL DEPTH (FEET)	DIAMETER (INCHES)	DEPTH TO WATER LEVEL (FEET)	USE
ME-616	Mr. Ray Wright 6616 Melrose St.					do
W-1	Louisville and Jefferson County Dept of Public Health		30			GM[4]
W-2	do		30			do
W-3	do		30			do
W-4	do		30			do
I-1	Stearns, Conrad & Schmidt Consulting Engineers, Inc.		31.5			do
I-2	do		55.0	2	50	do
I-3	do		30.0	do		do
I-4	do		60.0	do	55	do
I-5	do		30.0	do		do
I-6	do		65.0	do	54	do
I-7	do		31.5	do		do
I-8	do		56.5	do	50	do

APPENDIX E
SELECTED WELLS
IN VICINITY OF LEES LANE LANDFILL (cont)

WELL NO.	OWNER OR REPORTING AGENCY	ALTITUDE OF LSD[1] (FEET)	WELL DEPTH (FEET)	DIAMETER (INCHES)	DEPTH TO WATER LEVEL (FEET)	USE
I-9	do		31.5	do		do
I-10	do		56.5	do	50	do
I-11	do		32.0	do		do
I-12	do		56.5	do	51	do
I-13	do		31.5	do		do
I-14	do		46.5	do	40	do
II-1	do		5			do
II-2	do		5			do
II-3	do		5			do
II-4	do		5			do
II-5	do		5			do
II-6	do		5			do
II-7	do		5			do
II-8	do		5			do

APPENDIX E
SELECTED WELLS
IN VICINITY OF LEES LANE LANDFILL (cont)

WELL NO.	OWNER OR REPORTING AGENCY	ALTITUDE OF LSD[1] (FEET)	WELL DEPTH (FEET)	DIAMETER (INCHES)	DEPTH TO WATER LEVEL (FEET)	USE
II-9	do		5			do
II-10	do		5			do
II-11	do		5			do
II-12	do		5			do
II-13	do		5			do
II-14	do		5			do
III-1	do		46			do
III-2	do		40			do
III-3	do		23			do
III-4	do		44			do
III-5	do		39			do
III-6	do		36			do
III-7	do		40			do
III-8	do		40			do
IV-0	do		41.5		30.8	do

APPENDIX E
SELECTED WELLS
IN VICINITY OF LEES LANE LANDFILL (cont)

WELL NO.	OWNER OR REPORTING AGENCY	ALTITUDE OF LSD[1] (FEET)	WELL DEPTH (FEET)	DIAMETER (INCHES)	DEPTH TO WATER LEVEL (FEET)	USE
IV-1	do		36.5		33.8	do
IV-2	do		25.5		dry	do
IV-3	do		30.5		24.2	do
IV-4	do		30.5		dry	do
V-1	do		18	1.5		do
V-2C	do		51	do		do
V-2B	do		30	do		do
V-2A	do		15	do		do
V-3C	do		60	do	58	do
V-3B	do		30	do		do
V-3A	do		15	do		do
V-4C	do		51	do		do
V-4B	do		30	do		do
V-4A	do		15	do		do

APPENDIX E
SELECTED WELLS
IN VICINITY OF LEES LANE LANDFILL (cont)

WELL NO.	OWNER OR REPORTING AGENCY	ALTITUDE OF LSD[1] (FEET)	WELL DEPTH (FEET)	DIAMETER (INCHES)	DEPTH TO WATER LEVEL (FEET)	USE
V-5C	do		61.5	do		do
V-5B	do		40	do		do
V-5A	do		25	do		do
V-6C	do		10	do		do
V-6A-C	do		51.5	do	51	do
V-6A-B	do		30	do		do
V-6A-a	do		15	do		do
V-7C	do		51.5	do	50	do
V-7B	do		30	do		do
V-7A	do		15	do		do
V-8C	do		51.5	do	50	do
V-8B	do		30	do		do
V-8A	do		15	do		do
V-9C	do		51.5	do	50	do
V-9B	do		30	do		do

APPENDIX E
SELECTED WELLS
IN VICINITY OF LEES LANE LANDFILL (cont)

WELL NO.	OWNER OR REPORTING AGENCY	ALTITUDE OF LSD[1] (FEET)	WELL DEPTH (FEET)	DIAMETER (INCHES)	DEPTH TO WATER LEVEL (FEET)	USE
V-9A	do		15	do		do
LL-1	Kentucky Dept of Natural Resources and Environmental Protection	447.42	53	2	50	M[5]
LL-7[6]	do	418.37	26	6	16	do
LL-9	do	428.40	35.7	6	25	do
LL-10	do	425.20	29	6	22	do
LL-11	do	428.53	36	6	30	do
EW-1	Stearns, Conrad & Schmidt Consulting Engineers, Inc		30	4		GEW[7]
EW-2	do		do	do		do
EW-3	do		do	do		do
EW-4	do		do	do		do
EW-5	do		do	do		do
EW-6	do		do	do		do
EW-7	do		do	do		do

APPENDIX E
SELECTED WELLS
IN VICINITY OF LEES LANE LANDFILL (cont)

WELL NO.	OWNER OR REPORTING AGENCY	ALTITUDE OF LSD[1] (FEET)	WELL DEPTH (FEET)	DIAMETER (INCHES)	DEPTH TO WATER LEVEL (FEET)	USE
EW-8	do		do	do		do
EW-9	do		do	do		do
EW-10	do		do	do		do
EW-11	do		do	do		do
RR-22	Stauffer Chemical Co.	434.30			46.49	0[8]
51-11-1	Thienonan Bros. Farm	453.64			48.33	do
A2d	EPA-MSD Mill Creek EIS	439.10			32.06	do
A1d	do	432.40			25.05	do
RR-31	Paul Baugh	445.66			32.13	do
RR-29	Jefferson County	444.18			25.98	do
RR-30	do	442.96			18.00	do
RR-43	Louisville Gas & Electric Co.	430.48			41.46	do
78-3	Cane Run & L. Hunters	448.90			42.92	do
81-1	B. Pond Creek	440.58			23.42	do
RR-37	Flood Wall & L. Hunters	450.03			24.58	do
78-2	Cane Run & Greenwood	450.07			47.61	do
B-3-D	Greenwood & Mill Creek	424.90			13.48	do

WELL NO.	OWNER OR REPORTING AGENCY	ALTITUDE OF LSD[1] (FEET)	WELL DEPTH (FEET)	DIAMETER (INCHES)	DEPTH TO WATER LEVEL (FEET)	USE
B-2-D	Greenwood & Black Pond Ck.	443.40			25.75	do
B-1-D	Greenwood & Waller Lane	451.30			30.68	do
78-4	Kerry & W. Pages	455.43			21.54	do
RR-21	DuPont & River	440.20			54.92	do
RR-27	Kramers Lane	455.58			42.30	do
RR-39	End of Crums Lane	446.27			37.91	do
81-2	Crums Lane	444.91			28.26	do
RR-32	Garrs Lane	455.45			29.00	do
NCTWD	National Carbide	448.68			52.57	do
RR-26	39th & Algonguin	450.43			39.94	do
C-2	Sauer & Distillery	453.61			34.83	do
TW-2	Seagrams TW-2	458.64			30.81	do

1 LSD = land surface datum
2 D = domestic well
3 do = ditto or same as above
4 GM = Gas monitoring well
5 M = Ground-water monitoring well
6 LL-2,3,4,5,6,8 - no data available
7 GEW = Gas extraction well
8 O = Water-level observation well
(All observation well data supplied by USGS, Louisville, Kentucky)

APPENDIX F
SUMMARY OF AIR QUALITY DATA

WELL NO.	PERCENT METHANE	VINYL CHLORIDE PRESENT	SAMPLING AGENCY	REPORTING AGENCY	DATE OF GAS ANALYSIS	DATE OF REPORT
1	42		NEIC[1] Denver	NEIC Denver	1-9-79	2-19-79
2	76	yes	NEIC Denver	NEIC Denver	1-9-79	2-19-79
3	42		NEIC Denver	NEIC Denver	1-9-79	2-19-79
I-12 Level-1	56	yes	NEIC Denver	NEIC, Denver	1-10-79	2-19-79
I-12 Level-2	72		NEIC Denver	NEIC Denver	1-10-79	2-19-79
I-12 Level-3	79		NEIC Denver	NEIC Denver	1-10-79	2-19-79
I-4 Level-1	44	yes	NEIC Denver	NEIC Denver	1-10-79	2-19-79
I-4 Level-2	65		NEIC Denver	NEIC Denver	1-10-79	2-19-79
I-4 Level-3	70		NEIC Denver	NEIC Denver	1-10-79	2-19-79
I-3 Level-1	66	yes	NEIC Denver	NEIC Denver	1-10-79	2-19-79
I-3 Level-2	76		NEIC Denver	NEIC Denver	1-10-79	2-19-79
I-3 Level-3	75		NEIC Denver	NEIC Denver	1-10-79	2-19-79

APPENDIX F
SUMMARY OF AIR QUALITY DATA (cont)

WELL NO.	PERCENT METHANE	VINYL CHLORIDE PRESENT	SAMPLING AGENCY	REPORTING AGENCY	DATE OF GAS ANALYSIS	DATE OF REPORT
1	40		NEIC Denver	NEIC Denver	1-11-79	Feb. 1979
2	75	yes	NEIC Denver	NEIC Denver	1-11-79	Feb. 1979
3	38	yes	NEIC Denver	NEIC Denver	1-11-79	Feb. 1979
I-8 Level-1	27	yes	NEIC Denver	NEIC Denver	1-11-79	Feb. 1979
I-8 Level-2	31		NEIC Denver	NEIC Denver	1-11-79	Feb. 1979
I-8 Level-3	30		NEIC Denver	NEIC Denver	1-11-79	Feb. 1979
III 6600 Putman Ave	.4-.8		NEIC Denver	NEIC Denver	12-16-78	12-22-78
III Lees Lane & Putman	3.5-9.2		NEIC Denver	NEIC Denver	12-16-78	12-22-78
II Lees Lane & Putman	<0.1		NEIC Denver	NEIC Denver	12-16-78	12-22-78
I East end of Wilmoth	>15		NEIC Denver	NEIC Denver	12-16-78	12-22-78

APPENDIX F
SUMMARY OF AIR QUALITY DATA (cont)

WELL NO.	PERCENT METHANE	VINYL CHLORIDE PRESENT	SAMPLING AGENCY	REPORTING AGENCY	DATE OF GAS ANALYSIS	DATE OF REPORT
II 4416 Wilmoth	<0.1		NEIC Denver	NEIC Denver	12-16-78	12-22-78
III 4419 Wilmoth	1.6-8.3		NEIC Denver	NEIC Denver	12-16-78	12-22-78
III 4413 Wilmoth	>15		NEIC Denver	NEIC Denver	12-16-78	12-22-78
III 6508 Wilmoth	>15		NEIC Denver	NEIC Denver	12-16-78	12-22-78
Monitor well at 6720 Putman	>15		NEIC Denver	NEIC Denver	12-15-78	12-22-78
I-3B		yes	SCS Eng[2]	SCS Eng	12-13-78	12-16-78
I-4B		yes	SCS Eng	SCS Eng	12-13-78	12-16-78
I-5B		yes	SCS Eng	SCS Eng	12-13-78	12-16-78
I-10B		yes	SCS Eng	SCS Eng	12-13-78	12-16-78
I-11B		yes	SCS Eng	SCS Eng	12-13-78	12-16-78
I-12B		yes	SCS Eng	SCS Eng	12-13-78	12-16-78
I-2A	72	yes	SCS Eng	SCS Eng	7-20-78	7-20-78
I-4A	44	yes	SCS Eng	SCS Eng	7-20-78	7-20-78
I-6A	60	yes	SCS Eng	SCS Eng	7-20-78	7-20-78

APPENDIX F
SUMMARY OF AIR QUALITY DATA (cont)

WELL NO.	PERCENT METHANE	VINYL CHLORIDE PRESENT	SAMPLING AGENCY	REPORTING AGENCY	DATE OF GAS ANALYSIS	DATE OF REPORT
I-8A	30	yes	SCS Eng	SCS Eng	7-20-78	7-20-78
I-10A	48	yes	SCS Eng	SCS Eng	7-20-78	7-20-78
I-12A	68	yes	SCS Eng	SCS Eng	7-20-78	7-20-78
I-2A	40		SCS Eng	SCS Eng	8-4-78	8-4-78
I-6A	30		SCS Eng	SCS Eng	8-4-78	8-4-78
I-10A	22		SCS Eng	SCS Eng	8-4-78	8-4-78
I-12A	60		SCS Eng	SCS Eng	8-4-78	8-4-78
I-2A	65		SCS Eng	SCS Eng	8-18-78	8-18-78
I-4A	50		SCS Eng	SCS Eng	8-18-78	8-18-78
I-6A	70		SCS Eng	SCS Eng	8-18-78	8-18-78
I-8A	34		SCS Eng	SCS Eng	8-18-78	8-18-78
I-10A	50		SCS Eng	SCS Eng	8-18-78	8-18-78
I-12A	66		SCS Eng	SCS Eng	8-18-78	8-18-78
I-2A	74		SCS Eng	SCS Eng	8-31-78	8-31-78
I-4A	58		SCS Eng	SCS Eng	8-31-78	8-31-78
I-6A	70		SCS Eng	SCS Eng	8-31-78	8-31-78

APPENDIX F
SUMMARY OF AIR QUALITY DATA (cont)

WELL NO.	PERCENT METHANE	VINYL CHLORIDE PRESENT	SAMPLING AGENCY	REPORTING AGENCY	DATE OF GAS ANALYSIS	DATE REPORTED
I-8A	34		SCS Eng	SCS Eng	8-31-78	8-31-78
I-10A	58		SCS Eng	SCS Eng	8-31-78	8-31-78
I-12A	70		SCS Eng	SCS Eng	8-31-78	8-31-78
I-2A	66		SCS Eng	SCS Eng	9-16-78	9-16-78
I-4A	62		SCS Eng	SCS Eng	9-16-78	9-16-78
I-6A	72		SCS Eng	SCS Eng	9-16-78	9-16-78
I-8A	30		SCS Eng	SCS Eng	9-16-78	9-16-78
I-10A	60		SCS Eng	SCS Eng	9-16-78	9-16-78
I-12A	68		SCS Eng	SCS Eng	9-16-78	9-16-78
I-2A	83		SCS Eng	SCS Eng	10-3-78	10-3-78
I-4A	63		SCS Eng	SCS Eng	10-3-78	10-3-78
I-6A	78		SCS Eng	SCS Eng	10-3-78	10-3-78
I-8A	36		SCS Eng	SCS Eng	10-3-78	10-3-78
I-10A	60		SCS Eng	SCS Eng	10-3-78	10-3-78
I-14A	70		SCS Eng	SCS Eng	10-3-78	10-3-78
I-2A	36		SCS Eng	SCS Eng	10-3-78	10-3-78

APPENDIX F
SUMMARY OF AIR QUALITY DATA (cont)

WELL NO.	PERCENT METHANE	VINYL CHLORIDE PRESENT	SAMPLING AGENCY	REPORTING AGENCY	DATE OF GAS ANALYSIS	DATE OF REPORT
I-4A	58		SCS Eng	SCS Eng	10-3-78	10-3-78
I-6A	58		SCS Eng	SCS Eng	10-3-78	10-3-78
I-8A	52		SCS Eng	SCS Eng	10-3-78	10-3-78
I-10A	52		SCS Eng	SCS Eng	10-3-78	10-3-78
I-12A	70		SCS Eng	SCS Eng	10-3-78	10-3-78
I-14A	53		SCS Eng	SCS Eng	10-3-78	10-3-78
I-2A	60		SCS Eng	SCS Eng	10-21-78	10-21-78
I-4A	60		SCS Eng	SCS Eng	10-21-78	10-21-78
I-6A	65		SCS Eng	SCS Eng	10-21-78	10-21-78
I-8A	68		SCS Eng	SCS Eng	10-21-78	10-21-78
I-10A	70		SCS Eng	SCS Eng	10-21-78	10-21-78
I-12A	48		SCS Eng	SCS Eng	10-21-78	10-21-78
I-14A	48		SCS Eng	SCS Eng	10-21-78	10-21-78
I-2B	62		SCS Eng	SCS Eng	10-21-78	10-21-78
I-4A	58		SCS Eng	SCS Eng	10-21-78	10-21-78
I-6A	69		SCS Eng	SCS Eng	10-21-78	10-21-78

APPENDIX F
SUMMARY OF AIR QUALITY DATA (cont)

WELL NO.	PERCENT METHANE	VINYL CHLORIDE PRESENT	SAMPLING AGENCY	REPORTING AGENCY	DATE OF GAS ANALYSIS	DATE OF REPORT
I-8A	72		SCS Eng	SCS Eng	10-21-78	10-21-78
I-10A	68		SCS Eng	SCS Eng	10-21-78	10-21-78
I-12A	69		SCS Eng	SCS Eng	10-21-78	10-21-78
I-14B	68		SCS Eng	SCS Eng	10-21-78	10-21-78
III-1A	51		SCS Eng	SCS Eng	10-25-78	10-25-78
III-2A	32		SCS Eng	SCS Eng	10-25-78	10-25-78
III-3A	50		SCS Eng	SCS Eng	10-25-78	10-25-78
III-4A	22		SCS Eng	SCS Eng	10-25-78	10-25-78
III-6A	4		SCS Eng	SCS Eng	10-25-78	10-25-78
III-7A	66		SCS Eng	SCS Eng	10-25-78	10-25-78
III-8A	14		SCS Eng	SCS Eng	10-25-78	10-25-78
W-1	53		SCS Eng	SCS Eng	10-25-78	10-25-78
W-2	51		SCS Eng	SCS Eng	10-25-78	10-25-78
W-3	30		SCS Eng	SCS Eng	10-25-78	10-25-78
III-1A	9		SCS Eng	SCS Eng	11-1-78	11-1-78
III-2A	12		SCS Eng	SCS Eng	11-1-78	11-1-78

APPENDIX F
SUMMARY OF AIR QUALITY DATA (cont)

WELL NO.	PERCENT METHANE	VINYL CHLORIDE PRESENT	SAMPLING AGENCY	REPORTING AGENCY	DATE OF GAS ANALYSIS	DATE REPO
III-3A	48		SCS Eng	SCS Eng	11-1-78	11-1-78
III-7A	62		SCS Eng	SCS Eng	11-1-78	11-1-78
III-8A	26		SCS Eng	SCS Eng	11-1-78	11-1-78
W-1	12		SCS Eng	SCS Eng	11-1-78	11-1-78
W-2	64		SCS Eng	SCS Eng	11-1-78	11-1-78
W-3	33		SCS Eng	SCS Eng	11-1-78	11-1-78
IV-0-A (18')	42		SCS Eng	SCS Eng	11-1-78	11-1-78
IV-1-A (8')	45		SCS Eng	SCS Eng	5-3-79	7-30-79
IV-2-A (5')	27		SCS Eng	SCS Eng	5-3-79	7-30-79
IV-3-A (12')	23		SCS Eng	SCS Eng	5-3-79	7-30-79
IV-4-A (12')	58		SCS Eng	SCS Eng	5-3-79	7-30-79
IV-4-B (22')	72		SCS Eng	SCS Eng	5-3-79	7-30-79

NOTES: 1 National Enforcement Investigation Center
2 Stearns, Conrad and Schmidt Consulting Engineers, Inc.